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GENERAL
THERAPEUTICS
AND
MATERIA MEDICA:
ADAPTED FOR A
MEDICAL TEXT-BOOK.
WITH
INDEXES OF REMEDIES AND OF DISEASES AND THEIR REMEDIES.

BY
ROBLEY DUNGLISON, M.D., LL.D.,
PROFESSOR OF INSTITUTES OF MEDICINE, ETC., IN JEFFERSON MEDICAL COLLEGE OF PHILADELPHIA: FORMERLY PROFESSOR OF MATERIA MEDICA AND THERAPEUTICS IN THE UNIVERSITIES OF VIRGINIA AND MARYLAND, AND IN JEFFERSON MEDICAL COLLEGE OF PHILADELPHIA.

WITH ONE HUNDRED AND NINETY-THREE ILLUSTRATIONS.

SIXTH EDITION, REVISED AND IMPROVED.

IN TWO VOLUMES.

VOL. I.

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PREFACE

TO THE SIXTH EDITION.

Another edition of this Work being called for, the Author has subjected it to a thorough and careful revision. It has been gratifying to him, that it has been found so extensively useful by those for whom it was especially intended as to require that a *sixth* edition should be issued in so short a time after the publication of the fifth. Grateful for the favorable reception of the Work by the profession, he has bestowed on the preparation of the present edition all those cares which were demanded by the former editions, and has spared no pains to render it a faithful epitome of General Therapeutics and Materia Medica.

The copious Indexes of Remedies and of Diseases and their Remedies cannot fail, the Author conceives, to add materially to the value of the Work.

ROBLEY DUNGLISON.

Philadelphia, 1116 Girard Street.
July, 1857.

FROM THE

PREFACE TO THE FOURTH EDITION.

WHEN a second edition of his work on General Therapeutics was called for by his publishers, the Author deemed it advisable to incorporate with it an account of the different articles of the Materia Medica. To this he was led by the circumstance, that the departments of General Therapeutics and Materia Medica are always associated in the medical schools. In preparing the details on the latter department, he did not consider it advisable to go farther into the natural and commercial history of drugs than was indispensable for the medical student. He would fain hope, that the time may arrive when an acquaintance with the different branches of Natural History may be esteemed an essential preliminary or accompanying study; but as the medical schools of this continent are constituted, any lengthened investigation of these subjects by the Professor would be manifestly impracticable. In the short time allotted to a session of medical lectures there is scarcely opportunity afforded to teach that which is indispensable to the therapeutist.

In all cases, the Author has referred to the position held by the drug as an article of the organized, or of the inorganic kingdom; as well as to general matters of interest relative to the place where it is found, the manner in which it is obtained, and to certain points connected with its commercial history; but next to therapeutical applications, he has dwelt more at length on the sensible properties, by which the physician may be enabled to judge of the various articles from his own observation. In another work, he has remarked, that "it would, doubtless, be well that the physician should know the natural history of the animal whence he obtains his castor, his musk, &c., and that he should be acquainted with the botanical relations of the plants whose preparations he prescribes; but such a knowledge is no more *indispensable* than Greek is to an acquaintance with medical technology. The argument may, indeed, be extended to the consumer of the products of the animal and vegetable kingdoms as articles of diet. It would be well for him, no doubt, to be acquainted with the natural history of the ox, the sheep, the hog, &c., whence he derives his sustenance; yet, notwithstanding his ignorance on this point, universal experience demonstrates, that he has no difficulty in appropriating them to his dietetic necessities." Moreover, there were already valuable works in which all these topics, so interesting to the apothecary especially, are given at such length as almost to exhaust the subject; and of these, one of the most remarkable is that of Dr. Pereira, republished in this country under the competent supervision of Dr. Carson, Professor of Materia Medica in the Philadelphia College of Pharmacy.[1] Of this, the Author largely availed himself in the preparation of the second edition of the present work. He was likewise greatly indebted to the full and accurate Dispensatory of Drs. Wood and Bache—his learned colleagues in the revision of the Pharmacopœia of the United States (1842); to the Dispensatory of Dr. Christison; and, in a minor degree, to the work on Therapeutics and Materia Medica of MM. Trousseau and Pidoux. Nor did the modern German publications on the subject escape his attention.

His great object was to prepare a work on General Therapeutics and Materia Medica, which might aid the medical student in acquiring the main results of modern observation and reflection; and, at the same time, be to the practitioner a trustworthy book of reference.

The views of General Therapeutics are essentially the same as in the former editions. The Author has been pleased to find, that the period which has elapsed since their first promulgation, has but strengthened his belief in their general accuracy; so that he has not deemed it necessary to make many or great modifications. Throughout, he has adopted the nomenclature of the last edition of the Pharmacopœia of the United States;—a work which ought to be in the hands of every practitioner, as a guide in the preparation of medicines; and he has endeavored to arrange the articles in each division, as nearly as he could, in the order of their efficacy as therapeutical agents.

ROBLEY DUNGLISON.

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[1] Now Professor of Materia Medica and of Pharmacy in the University of Pennsylvania.

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GENERAL THERAPEUTICS

AND

MATERIA MEDICA.

CHAPTER I.

GENERAL CONSIDERATIONS.

Therapeutics defined—Instinctive action of recuperation—Importance of bearing it in mind in the treatment of disease—Cure by sympathy—Expectant medicine—Efforts of nature—Crises—Medical experience—Science of medicine demonstrative—Pre-eminence of therapeutics—Therapeutical indications vary with medical theories—Necessity of discovering the pathological lesion—Rational therapeutics founded on rigid physiologico-pathological deduction—Importance of discovering the cause of the lesion—Etiology obscure—Early medical practice—The Asclepiades—Empirics and Dogmatists—French Medical School of Observation—Numerical methods—Necessity for observation and reasoning—Hematology—Importance of principles in medicine.

THERAPEUTICS is the branch of Medical Science which comprises the doctrine of the management of disease. Generally, however, the term is restricted to a description of the *modus operandi* of medicines; and the department is commonly associated, in our Institutions, with Materia Medica; whilst the Practice of Physic is confided to a distinct Professor. Under this division, General Therapeutics is made to embrace the principles of medicinal administration, and the indications, which the different articles of the Materia Medica are capable of fulfilling; whilst the Chair of Practice is appropriated, so far as regards Therapeutics, to the application of those principles to particular morbid conditions, or to what has been called Special Therapeutics. It is the business of the physiologist to investigate the functions of healthy man; the pathologist regards those functions in disease, and the therapeutist endeavors to restore them from the latter to the former condition.

There is no branch of medicine with which the therapeutist ought not to be acquainted. To be a good therapeutist requires not only that he shall have had extensive opportunities for witnessing disease, but shall have read extensively the recorded observations of others. It demands, too, the utmost powers of discrimination;—hence, the varied knowledge, which the physician ought to possess, and the learning and dignity of the science.

It might be imagined, that lectures on Therapeutics are unnecessary, where the mode of managing individual diseases is given from the Chair of Practice; in the latter case, however, the principles are necessarily diffused—not sufficiently embodied—and, moreover, the teacher generally presumes, that the student—which rarely happens—is imbued with the great principles and rules, that apply to the administration and *modus operandi* of medicines.

In the state of health the various functions are executed in a regular and harmonious manner, and are intimately connected by consent or sympathy; but if a morbific cause impresses the organism, this harmonious condition is disturbed; a fresh series of actions results, and disorder supervenes.

Physiologists have noticed in every living body an instinctive action—an action of the living principle, whenever manifestly directing its operations to the health, preservation, or reproduction of a living frame, or of any part of it. This applies to the plant as well as to the animal. It is the *vis medicatrix naturæ*, for and against which so much has been said; but which—if restricted to the abovementioned acts—can no more be denied than the existence of life, of which we know nothing except by its results. It is strikingly witnessed in the reparatory power exerted by living bodies after the receipt of an injury. If we tear a branch from a tree, we find, that the injury done to the parent trunk is repaired by an action analogous to that set up by the animal whenever a wound is inflicted upon it. In some vegetables, the reparatory power is so energetically exerted, that lost parts are restored; and it is upon this power that the utility of certain garden vegetables—spinach, parsley, cress, &c.—reposes. Such a reparatory power is occasionally—but rarely—met with in the animal kingdom. We see it in the lobster deprived of its claw, and in the serpent that has lost its tail. The nails and hair, too, regain their accustomed length when cut, and the same thing happens to the teeth of the Rodentia or gnawers.

Few animals, however, possess, to any extent, the power of restoring lost parts; but all are capable of repairing injuries, and of removing disease when it is within certain limits. In cases of wounds and broken bones, the efforts of the surgeon are chiefly restricted to keeping the parts in apposition, and to preventing the intrusion of extraneous irritants, whilst his reliance is placed on those sanative powers that are seated in the wounded part, as in every part of the living frame. It is to this power that we ascribe all the properties assigned to the cure by sympathy, which, at one time, excited so much attention, was promulgated by the Rosicrucians, and obtained universal credence in the seventeenth century. This consisted in applying dressings, in the case of wounds, not to the injured parts, but to the weapon that inflicted them. The sympathetic powder of Sir Kenelme Digby was an application of this nature, which enjoyed an astonishing reputation. It was first employed at Florence, in the commencement of the seventeenth century, by a Carmelite monk, who had just returned from India. The grand duke, hearing of the monk's marvellous cures, asked him for his secret, which he refused, fearing that the duke might divulge it. Some time afterwards, Sir Kenelme having rendered an important service to the monk, the latter, out of gratitude, communicated to him the composition of the powder, and Sir Kenelme took the secret with him to England. An opportunity soon occurred for testing its properties. A Mr. Howell, having been wounded in attempting to separate two of his friends who were engaged in a duel, was subjected to its employment. Four days after the infliction of the wound, Sir Kenelme dipped one of Mr. Howell's garters in a solution of the powder; and immediately—it is asserted—the wound, which was previously painful, became easy; but as the garter grew dry, the pains returned, and were relieved by a fresh immersion of the garter in the solution. In five or six days, the wound healed. James the First; his son—afterwards Charles the First; the Duke of Buckingham, and all the principal personages about the Court, were acquainted with the circumstances of the case; and James—whose enthusiasm was not counterbalanced by much judgment, and who was, withal, superstitious in the highest degree—obtained the secret from Sir Kenelme, and performed most astonishing cures. In no great length of time the composition transpired, and, as in all like cases, the charm evaporated with the disclosure.

The powder, employed by Sir Kenelme, is asserted to have been sulphate of copper, prepared in a particular manner. Some affirm that it was the ordinary green vitriol of commerce. Dryden alludes to the superstition more than once in his "*Tempest, or Enchanted Island.*" Thus, Ariel:

"When I was chidden by my mighty lord,
For my neglect of young Hippolito,
I went to view his body, and soon found
His soul was but retired, not sallied out;
Then I collected
The best of simples underneath the moon,
The best of balms, and to the wound applied
The healing juice of vulnerary herbs.
His only danger was his loss of blood;
But now he's waked, my lord, and just this hour
He must be dressed again, as I have done it.
*Anoint the sword, which pierced him, with this weapon-salve, and
wrap it close from air, till I have time to visit him again.*"
Act v, Scene 2d.

And:—Miranda, when she enters with Hippolito's sword wrapped up:

"*Hip.* O, my wounds pain me!
[*She unwraps the sword.*]
"*Mir.* I am come to ease you.
"*Hip.* Alas! I feel the cold air come to me:
My wound shoots worse than ever.
[*She wipes and anoints the sword.*]
"*Mir.* Does it still grieve you?
"*Hip.* Now methinks there's something
Laid just upon it.
"*Mir.* Do you find no ease?
"*Hip.* Yes. Yes: upon the sudden all this pain
Is leaving me.—Sweet Heaven, how I am eased!"
Act v, Scene 2d.

It is likewise referred to in the third Canto of the "*Lay of the Last Minstrel*," of SIR WALTER SCOTT.

The sympathetic ointments, applied to the weapon, or the "armatory unguents," as they were termed, were of various characters, containing the most absurd, disgusting, and often inert ingredients. The following extract from the *Sylva Sylvarum*," or "Natural History" of Lord Bacon, strikingly exhibits this. The mode of managing the wound sufficiently accounts for the good effects ascribed to the cure by sympathy. "It is constantly received and avouched, that the anointing of the weapon that maketh the wound will heal the wound itself. In this experiment, upon the relation of men of credit, though myself, as yet, am not fully inclined to believe to it, you shall note the points following: First, the ointment with which this is done, is made of divers ingredients; whereof the strangest and hardest to come by are the moss upon the skull of a dead man unburied, and the fats of a boar and a bear killed in the act of generation. These two last I could easily suspect to be prescribed as a starting-hole, that if the experiment proved not, it might be pretended, that the beasts were not killed in the due time; for as for the moss, it is certain there is great quantity of it in Ireland upon slain bodies, laid in heaps unburied. The other ingredients are the blood-stone in powder, and some other things, which seem to have a virtue to stanch blood; as also the moss hath. And the description of the whole ointment is to be found in the chymical dispensatory of Crollius. Secondly, the same kind of ointment applied to the part itself worketh not the effect, but only applied to the weapon. Thirdly, which I like well, they do not observe the confecting of the ointment under any certain constellation, which commonly is the excuse of magical medicines when they fail, that they were not made under a fit figure of heaven. Fourthly, it may be applied to the weapon, though the party hurt be at a great distance. Fifthly, it seemeth the imagination of the party to be cured is not needful to concur; for it may be done without the knowledge of the party wounded; and thus much has been tried, that the ointment, for experiment's sake, hath been wiped off the weapon, without the knowledge of the party hurt, and presently the party hurt has been in great rage of pain, till the weapon was reanointed. Sixthly, it is affirmed, that if you cannot get the weapon, yet if you put an instrument of iron or wood, resembling the weapon, into the wound, whereby it bleedeth, the anointing of that instrument will serve and work the effect. This I doubt should be a device to keep this strange form of cure in request and use, because many times you cannot come by the weapon itself. Seventhly, *the wound must be at first washed clean with white wine, or the party's own water; and then bound up close in fine linen, and no more dressing renewed till it be whole.* Eighthly, the sword itself must be wrapped up close, as far as the ointment goeth, that it taketh no wind. Ninthly, the ointment, if you wipe it off from the sword and keep it, will serve again, and rather increase in virtue than diminish. Tenthly, it will cure in far shorter time than ointments of wounds commonly do. Lastly, it will cure a beast as well as a man, which I like best of all the rest, because it subjecteth the matter to an easy trial."

The lines in the above quotation, marked in italics, are the key to the solution of the whole mystery. It is the practice adopted at the present day in the treatment of incised wounds, and to this—not to the influence of the sympathetic powder, or armatory unguent, it need hardly be said—must the main curative agency be ascribed; whilst a portion may be assigned to the mental revulsion produced on the sufferer, through his faith in the virtues ascribed to the application. The wound was carefully defended from the irritation of extraneous substances, and given up to that instinctive principle, which, we have seen, repairs the injuries to which organized bodies are liable; and it has been suggested, that the results furnished the first hints which led surgeons to the improved practice of healing wounds by what is technically called the "first intention."

The existence, then, of such an instinctive power can neither be denied nor lost sight of in the treatment of disease. The error has been, that undue weight has been attached to it, so that the practitioner was altogether guided by its manifestations—or fancied manifestations—in laying down his indications of cure; and if no such manifestation existed, he waited vainly—and too often unfortunately—until the time had perhaps gone by for the successful administration of efficacious agents. To this system of "waiting or expecting" the term *medicina expectans—la médecine expectante*—was appropriated. The followers of Stahl—the great apostle of the doctrine—supposed a power to be present in the system of repelling morbific influences, and of re-establishing equilibrium when disturbed. There are but few cases, however, in which trust can be safely placed in this power. It too often happens, that diseased action in a tissue goes on augmenting, until the functions of other tissues become deranged by extension of morbid action, or by sympathy; and disorganization and death follow. Yet the doctrine of Stahl is still maintained by many practitioners—of the old world more especially; and, by some who reject it, terms are frequently employed, which may be regarded as its relics. We often hear, for example, of "efforts of nature," yet the ideas attached to the expression are very unprecise. If diarrhœa should supervene about the favorable termination of a protracted fever, it is looked upon as "critical,"—as a *bénéfice de ventre*, or a *bénéfice de la nature;* but if, on the other hand, diarrhœa supervenes in phthisis pulmonalis, as an accompaniment of the hectic fever, proves colliquative, and hastens dissolution, we hear nothing of its being an effort to disembarrass the economy—or of its constituting a crisis. If, again, an individual has suffered under headache, giddiness, and other symptoms of encephalic uneasiness, and epistaxis takes place, after which the symptoms are removed or mitigated, the hemorrhage is regarded as an effort of nature, although it was doubtless dependent upon the same pathological condition that gave rise to the headache and the other phenomena; but should the hemorrhage occur to such an extent as to excite alarm, or to prove fatal, nothing is said of its being an effort of nature. In the same manner, if hemorrhage occurs in the brain or in the lungs, we rarely or never hear this mode of accounting for it.

Yet, although we may discard the notion of efforts of nature, there is no doubt, that good occasionally results from spontaneous discharges, and that, at other times, their supervention indicates a change in functions which may have been long disordered and a restoration to the healthy condition. Thus, where polyæmia or plethora exists in the vessels generally, or in those of some portion of the economy, the supervention of moderate hemorrhage may diminish the intensity of the cause; and diarrhœa, or perspiration supervening on a fever of some duration, in which the secretory function has been disordered, may indicate, that the organs of secretion are assuming a new condition, and that the morbid catenation, previously existing, is beginning to disappear. Although, then, we may not be justified in regarding such discharges as indicating any effort of nature, they may be, and doubtless frequently are, salutary.

An attention to these topics will lead to the combating of irregularities when they occur in the organic actions, provided they are beyond the due point; and, at the same time, teach us not to interfere too much with the instinctive actions, provided they seem to be going on favorably. The therapeutist must be guided, however, by observation and reflection as to his rule of conduct in each case. In the very complex operations of the animal frame, the relation between cause and effect is not always readily appreciable; great caution is, therefore, necessary on the part of the observer, lest, in place of *facts*—properly so called—he should register such as have been termed—not inappropriately—" false." Should he incur this error, owing either to the intrinsic difficulty of the subject, or to his incompetency as an observer, a foundation may be laid for other erroneous observations; and deductions, and experience may thus be acquired; but such experience may be, in the sequel, most unfortunate. The public are, unhappily, too apt to be led away by this idea of " experience;" erroneously believing that all are capable of profiting by it, and, consequently, that every one who has been sufficiently long engaged in the pursuit of his profession must necessarily be experienced and wise. Were all men equally attentive, and equally gifted with adequate powers of observation and reflection, the deduction would be just; but this is by no means the case. If a man cannot observe and reason on topics of a general nature, he cannot on such as appertain to medicine; and, accordingly, the best rule for estimating the abilities of the physician by the unprofessional is by examining into the character of his mind, his modes of reasoning, his degree of mental application, and his general qualifications. A man of ordinary mind, application, and attainments, may register a few facts; and by comparing them together, may deduce useful inferences so far as these facts may permit, and in this way may prescribe sufficiently well in ordinary cases; but such cases are not the touchstone of knowledge. In the multitude of trying cases that present themselves to every practitioner in the course of his career, what painful anxiety is felt, if he be well informed in his profession, and, withal, a philanthropist! What careful comparison of his own experience with the recorded experience of others! What an amount of physico-moral reflection before he decides! Perhaps in no other profession or calling are the intellectual and moral faculties so much enlisted. But what consolation awaits the physician, if he can feel satisfied, that the result, at which he has arrived, accords with the just demands of the case,—that the decision is adequate to the emergency! These are cases in which ignorance is bliss, but how fearful the responsibility of such ignorance!

The curriculum of study, required in the different Medical Colleges, has been suggested by a wise care for the lives and the health of the public, and such a period of attendance upon the lectures that constitute it has been prescribed as may enable the industrious—even if not highly gifted—to qualify themselves for entering upon the broad field of observation, and of extended usefulness into which their avocation may carry them. It is within collegiate walls, that the student acquires the prominent facts of his profession, and the great principles appertaining to its practical administration. He there learns the theory or laws of phenomena, on which all sound and rational practice is based. Too often, amongst the uninformed, the theoretical and the practical pursuit of a calling are placed in unworthy contrast. In no art can sound practice exist without theory. Theory is the mental process which binds observed facts or phenomena together; compares them with each other, and deduces appropriate rules of practice. It is to theory that we are indebted not only for full practical usefulness, but for every science. Facts are, doubtless, the elements of science, but the science itself does not exist, until these facts have been brought together, sifted and compared, and great general principles or laws deduced therefrom.

In such sifting and comparison a multitude of miscalled facts have to be discarded. In the science of medicine—in every science—those that merit the epithet *false* are numerous, and many of them rest on the authority of the heedless observer, who arrives at his conclusions without due examination. The theoretical investigation of science renders a man cautious even to scepticism. Very few, therefore, of the mass of recorded facts originate with him: he has little to do in accumulating the chaff that envelopes the grain. The records of the Patent Office of every country tend to elucidate this matter. It has been properly observed, that every patent is a speculation. Who, then, are the great speculators? Not the theoretical men, in the sense in which we have used the term, but what are called practical men,—men, who narrow themselves down to observed facts in their own profession or calling, and who, in consequence of their ignorance of theory, soon find that their inventions are no important additions to existing knowledge. A writer on this subject asserts, that he had made a rough estimate of the number of scientific persons who have published works relative to new inventions in arts, and he finds, that in Europe they did not exceed two hundred during the whole of the last century, whilst there were not fewer than that number of patents taken out in England annually. An adequate acquaintance with scientific truths would prevent this waste of time and talent; and hence it is, that a combination of theoretical and practical knowledge is necessary to lead to lofty and enduring results. This is the great improvement in the modern method of teaching the practical sciences. That, which was formerly oracularly delivered from the chair as the result of the experience of the master, is not now promulgated as indisputable. It is placed before the inquirer as a fact, over and over again examined and scrutinized, and the reasons for any opinion are fairly stated as elements for his decision. The time has passed away, when the human mind is to credit the mere *verba magistri*, or to place implicit credence in a scientific assertion, without examination, because it proceeds from this or that individual. The rule of conduct, implied in the language of the Roman Satirist,—"Marcus dixit, ita est;"—

> "Did Marcus say 'twas fact? then fact it is;
> No proof so valid as a word of his"—

has been too much inculcated in all ages, and no science has suffered so much from it as medicine. It has been properly remarked by Dr. Abercrombie, in his "Inquiries concerning the intellectual powers and the investigation of truth," that in receiving facts on the testimony of others, we require to be satisfied not only of the veracity of the narrators, but also of their habits as philosophical observers, and of the opportunities, which they have had of ascertaining the facts. In receiving affirmed truths, therefore, the inquirer has to exercise caution; but at the same time to be careful lest by attempting to avoid one error he may incur another, and may pass from credulity to ill-judged scepticism—extremes, which the mind, anxious after truth, will carefully avoid.

In the management of disease it is not always necessary, that drugs should be given, unless their use is clearly indicated; or unless, in the case of certain nervous and impressible individuals, whose faith is not reposed in any system of medication that does not include the use of internal medicines. To obtain this faith is an important desideratum, as will be seen hereafter, in the treatment of many diseases, of a nervous character especially. The physician exhibits his skill better by controlling disease by appropriate regimen than by administering combinations of whose effects he often knows little, and where much of his practice must necessarily be involved in conjecture. The science of medicine is more demonstrative than is usually imagined, and, where the case is not so, the practitioner had better for the time do nothing. Any experiment may have one of two opposite results; it may do *good* or *harm;* and hence a practitioner is not justified in administering a powerful medicinal agent at random. If he be desirous of instituting experiments, he ought to take example from some modern therapeutical inquirers in Germany, and make them upon himself, rather than upon his patients.

It cannot often happen, however, that the physician is at a loss what course to pursue. His physiological and pathological knowledge will indicate what ought to be the great principles of management; and his acquaintance with the remedial virtues of the different articles of the materia medica will suggest the proper agents for carrying those principles into action.

To elucidate this, the case of the drug opium may be taken. It is known that it will allay irritation, and produce sleep; a knowledge acquired from observation. It is known also, that in a large dose it is sedative; in a small dose stimulant. When a case of inflammation occurs, the physician is not deterred from its use, because it excites in a small dose; but gives it in a quantity sufficiently large to insure the sedative operation. Accordingly, observation and reflection have led to the employment of this useful drug in cases where the practitioner, a few years ago, would not have ventured upon it. It is by empirical trials, that we become informed of the properties of any medicinal agent, after which sound physiological and pathological knowledge suggests its correct application.

The great object of the science of medicine is to remove or assuage disease. Hence the pre-eminent importance of Therapeutics. It has been largely modified by prevalent systems or doctrines, yet it bends less to system than any other branch of medicine; and, accordingly, many of the different sects which have existed from time to time have been overthrown by this great test of their validity or weakness. In the closet, a consistent scheme may be formed on paper, but when it comes to be applied clinically, it may be often found to fail. It is obvious, that, *cæteris paribus*, Therapeutics should be the touchstone of medical skill. The number of cures ought to decide the qualifications of the practitioner; but it is so extremely difficult —indeed impossible—to estimate all the deranging influences,—so many modifying circumstances are perpetually occurring, that it cannot be decided that any two cases are precisely identical. Hence, we can never judge of the comparative success of different practitioners, on which so much stress is placed—and placed erroneously —by the public. Owing to these difficulties, also, we have such a diversity of sentiment regarding the treatment of the same affection.

Therapeutical indications vary much, however, with medical theories. By indication is meant—the end to be had in view in the administration of remedies. For example, in a case of polyæmia or overfulness of blood, the indication is obviously to diminish the amount of the circulating fluid. Indications have necessarily been greatly influenced by the views of the dominant medical sect. The humorist or humoral pathologist, who looked to the fluids as the cause of all maladies, directed his attention to the removal of a fancied acridity, acidity, or alkalescency of the humors, or to evacuate them after they had experienced a kind of maturation or preparation, which he called *concoction;* whilst the mechanical philosopher attended to the permeability, or the contrary, of vessels,—the effects of gravity, and the like; and his indications were based upon his ideas on those matters. But those systems, and the Therapeutics founded on them, have passed away; not, however, without having left useful mementos of their existence; for it is obvious, that the conditions which they invoke cannot be wholly disregarded: the evil with those pathologists was, that they assigned to them too prominent a rank in the causation of disease, and that they attended to them to the exclusion of more important agencies.

One of the greatest errors in the investigation of disease, and its mode of management, is the belief which long existed, and still exists with the mere routine practitioner, that it is only necessary to attend to symptoms or phenomena, and to combat the most prominent as they occur. This is obviously insufficient without appreciating the organ that is suffering, and the precise nature of the existing lesion. The same symptom may be present in diseases of very different character; and before the therapeutist can lay down any satisfactory indications of treatment, inquiry must be made into those circumstances, as well as to detect whether the mischief in the organ be primary or secondary, idiopathic or symptomatic;—in other words, whether the morbid mischief commenced in the main seat of the disease, or began in some other organ or tissue, and extended to it by virtue of that correlation, which plays so important a part in every physiological, as well as pathological, condition of the functions. The insufficiency of attending simply to the more prominent symptoms is readily elucidated by a few cases. A feeling of debility is a distressing symptom in the most inflammatory, as well as in the most enfeebling, disorder; yet how different the treatment! Itching of the glans penis is symptomatic of stone in the bladder. Itching of the nose, where the mucous membrane commingles with the skin, occurs in irritation of the lining membrane of the intestinal canal: in hepatitis, excruciating pain is occasionally felt at the top of the shoulder: painful retraction of the testis occurs in nephritis; and intolerance of light and sound are distressing symptoms of cephalitis. But it would be extremely unphilosophical to attend solely or mainly to those prominent symptoms. The primary seat of irritation must be inferred from them, and from farther attentive examination; and it is not until the physician has attained a thorough knowledge of the seat and nature of the disease, that a rational basis can exist for his curative indications. The lesion of the affected organ must be appreciated. This is the point of departure for an enlightened practice. To resolve this question demands a careful inquiry into etiology, as well as into physiological pathology, and not until this has been effected can the practitioner properly determine on the indications that require fulfilment, and on the mode of fulfilling them.

The fundamental object, in every indication, is to put a stop to or mitigate the disorder in the organic actions, and to remove any alteration that may have supervened in the tissues consequent on such disorder. If inflammation, for example, takes place in any organ, the indication is, during the active stage, to remove the particular state of vessels concerned in the morbid condition; and if suppuration, induration, or any other of the terminations of inflammation should ensue, to have recourse to the appropriate remedies for their removal. When once the primary organic lesion is removed, the symptoms occasioned by it will disappear; unless, as in the case of the terminations of inflammation, irritations—which have become independent of the primary affection—should persist, and give rise to a special train of symptoms. The attention of the therapeutist has, consequently, to be directed, in the first instance, to the *primary* lesion, and afterwards to the *secondary* or *symptomatic.*

The nature of the disease, then, or the precise species of vital modification of tissue, that gives occasion to the morbid phenomena, must be the basis of every therapeutical indication; and although the symptoms or manifestations may differ in the different ages and sexes, and according to the strength, &c., of the patient, the indications will be essentially the same; and the treatment will rest on the same general principles, requiring modifications according to circumstances; but these constitute secondary considerations. In inflammation, for example, the general rule must be laid down, that the ordinary antiphlogistic remedies are indicated; and this whatever may be the seat of the inflammation, or the strength, age, habit, &c., of the patient; still, many modifications in the treatment may be demanded according to those various circumstances. The precise morbid condition of tissue in inflammation is, at times, extremely difficult of detection. To explain this, the case of a bloodshot eye may be taken,—a state of the conjunctiva in which several files of red corpuscles are forced into vessels, which in health admit perhaps but a single file. A grain of sand, or some extraneous substance, has excited irritation in the conjunctiva, and the consequence has been an afflux of fluids to the irritated part. The smaller arteries have taken upon themselves augmented action; blood has been sent in undue quantity into the extreme vessels, which have become over-distended; so that, in the case assumed, there is an over-distended state of extreme vessel, and an over-excited state of the artery communicating with it. This is a familiar and striking example: it does not, however, apply only to the bloodshot eye, but to every case of inflammation. In this state of parts, it is manifest, that so long as the extreme vessel remains over-dilated, there will be remora of blood in it to a greater or less extent; the circulation cannot proceed as uninterruptedly through it as through a capillary vessel, whose coats and the tissues surrounding the vessels are in a condition of healthy tone; owing to this circumstance, excitement is kept up in the vessels immediately communicating with the over-distended extreme vessels, which excitement continues so long as the over-distension persists, and, in many cases, the irritation is extended from the parts first affected to the general sanguiferous system, until ultimately the heart and arteries are in a state of excitation and turmoil.

Now, a great difficulty in investigating the pathology and treatment of inflammation consists in our not always being able to discover whether this atonic condition of the extreme vessel, induced by over-distension, or the over-excited state of the vessel communicating with it, is the condition which more especially requires attention: hence the difficulty of saying, in all cases, whether the topical use of astringents or stimulants, or the opposite plan of treatment —the soothing—ought to be had recourse to. Every practitioner meets with this difficulty, and accordingly, in cases of external inflammation, he is often compelled to resort empirically to one set of applications; and, if it should not succeed, to another of an opposite character.

In certain textures of the body, the predominance of over-distension of extreme vessel appears to exist, when they labor under inflammation, more commonly than in others. This seems to be the case with inflammation of the skin and mucous membranes, which belongs to the variety of *erysipelatous* inflammation: whilst that of the areolar and serous membranes is of a more active cast, and may be regarded as appertaining to the *phlegmonous* variety. Accordingly, in erysipelas, and in some of the inflammations of mucous membranes, remedies are occasionally had recourse to, which can rarely be employed in inflammation of the areolar membrane. For example, in some varieties of burn, or erysipelatous inflammation of the skin, stimulating applications are found of service; whilst in others, where the excitement in the communicating vessels is great, antiphlogistic agents are demanded. Cases of inflammation of the conjunctiva have been recorded, in which decided advantage was produced by dropping the essential oil of lemons upon the inflamed surface; and, in most cases of chronic inflammation, the topical application of gentle excitants is found to be beneficial; accordingly, after gonorrhœa, which is an inflammation of the lining membrane of the urethra, has continued for a long period, we attempt to arrest the discharge by astringent excitants, and if these are insufficient, the bougie is sometimes passed, to excite, by contact, the vessels to their healthy tone; and in this manner the gleet is often got rid of, after it had resisted the continued use of ordinary antiphlogistics. In these cases—as in all others—rational treatment is founded on rigid physiologico-pathological deductions.

It is important in every morbid condition to inquire into the cause, that may have produced, or is producing, the phenomena. That this must be removed, when practicable, is a self-evident indication. The maxim, "*Tolle causam cessat effectus*," although often true, is not always so. If a thorn be run into the flesh, irritation exists so long as the thorn remains there; and if it be removed, the recuperative powers of the part speedily repair the injury that has been inflicted. In like manner, if a decayed or loose tooth be exciting repeated gum-boils, the obvious remedy is to remove the tooth. But in the large mass of morbid conditions, although the cause, which immediately produced the disease, is taken away, the complaint continues. A man, from a night's sojourn in a malarious district, may receive a sufficient dose of the exciting cause to induce intermittent fever, and although he may be removed from the unhealthy locality, the fever will persist after his change of residence. It may be said that, in this case, the malaria may still be present in the system; and this is possible; but it is more probable—more consistent with analogy—that a morbid influence is exerted on the economy from such exposure, and that the effects go on notwithstanding the abstraction of the morbid cause; in the same manner as a disease, produced by local irregularity of action in the capillary system owing to exposure to cold and moisture, may persist, notwithstanding the removal of the cause has been complete. There is probably, at all times, a greater predisposition in the organism to diseased action in some particular organ or tissue than in another; so that if irregularity of organic action be induced in any external part of the body, the mischief may not supervene in the part where such irregularity exists, but in the organ especially predisposed to assume a morbid action, through the extensive sympathy which exists between every part of the system of nutrition. Owing to this circumstance, the difficulty in discovering the precise cause of a disease is often extreme. Fortunately, the discovery is not always a matter of moment, inasmuch as the disease usually continues independently of the cause; and it is the disease—the modification in the structure or functions that constitutes the pathological condition—which we have to combat. In all cases, the patient is anxious to find out, and to suggest, a cause; and the suggestions are frequently of the most unphilosophical character; but although the practitioner may feel this, it is not necessary that he should show it.

Allusion has been made to the influence exerted from time to time by dominant medical sects on Therapeutics. Such reminiscences are often well adapted for diminishing our pride in what are regarded modern improvements, and for inducing us to form a more exalted opinion of our brethren in ancient periods. The credit of original conception has, indeed, been often awarded for observations and opinions, which had been inculcated ages before; escaped notice, and been subsequently re-propounded;—the ancient and the modern being equally entitled, perhaps, to the credit of originators. By such reminiscences we may, moreover, be enabled to trace the course of improvements, and to throw light upon many practices, which although frequently the offspring of superstition and credulity, were not without their influence on the progress of the science, and, under some form or other, are in active operation at the present day.

A knowledge of the effects of remedial agents must have been obtained everywhere in the same manner,—in the infancy of the world as in savage and uncultivated nations at the present day. Individual experience furnished remedies; accident, in almost all cases, leading to a knowledge of their powers over the living economy; and analogy suggesting their application to disease. In no other way than by accident could the knowledge, that jalap acts as a cathartic, or that opium is possessed of anodyne virtues, have been obtained. Even now, when illumined by all the lights which the collateral sciences have shed upon that of medicine, our experience with a new article of the materia medica must be wholly tentative; but as soon as we acquire an acquaintance with its effects on the organism, our physiological and pathological knowledge enables us to apply it rationally, with full advantage, to the treatment of disease. Until, however, the properties of any new drug are known, great caution is necessary in making use of it. Camerarius first, and De Candolle afterwards, showed—what is now notorious—that there is considerable analogy in the action on the organism of vegetables which resemble each other in their external characters or botanical relations; and hence, that the arrangement of plants into natural groups or families is calculated to aid us in estimating the alimentary or medical properties of untried vegetables,—a method of investigation most useful to those who are shipwrecked on foreign and unknown shores, and whose subsistence may have to be derived from the vegetable products; and one also of great value to the scientific naturalist in his appreciation of the various new plants which he may have occasion to examine, as respects their utility in rural economy or in medicine. Yet this rule of guidance must not be considered absolute. The *gramineæ* have farinaceous and nutritive seeds; the *labiatæ* are stomachic and cordial; the seeds of the *umbelliferæ* are tonic and stimulant; those of the *euphorbiaceæ* acrid and purgative; the juice of the *coniferæ* is resinous; and the bark of the *amentaceæ* astringent and febrifuge. Such is the general fact; but there are some striking exceptions;—the deadly conium, for example, is alongside the nutritive and innoxious carrot; the sweet potato touches the acrid jalap; the bitter colocynth may be mistaken, by the eye, for the melon; the potato is amongst the poisonous solaneæ; the lolium temulentum, of deleterious agency, amongst the cerealia; and the fatal cherry-laurel is in close relationship with the plums and the cherries.

In the infancy of our art, the number of remedial agents whose virtues were learned by experience must necessarily have been few; yet we have no record of a period when such agents were not known. Experience of particular articles was derived from accidental injuries; and, in the origin of the art, surgery was doubtless greatly in advance of medicine. Sympathy for suffering incited to exertion, with the view of discovering some method of relief; and where sensible agencies failed, recourse was had to charms, incantations, and amulets, suggested by ignorance and superstition, amongst the rude and barbarous nations of the present day, almost as extensively, and confided in as implicitly, as in the cradle of mankind. If the patient died, the event was ascribed to the will of the gods; if he recovered,—by virtue of those instinctive powers which are seated in every organized body, animal and vegetable, and without which the efforts of the physician would be vain,—a case of cure was recorded; but no inquiry was made as to the precise agency exerted. To the charm, the incantation, the amulet, was ascribed the whole result; tradition handed down the knowledge of its presumed efficacy, and led to its employment in similar cases. Would that we were much more philosophical even in the nineteenth century; for we meet with many like cases, that exhibit but a slight remove from those conditions of ignorance and barbarism, even in people that would start at the idea of being assimilated to the benighted of those remote ages, or the scarcely less elevated members of a barbarous community of the present day!

For a long period of history, even amongst the most enlightened nations, there could have been only empirical medicine acquired in this manner; and all medical instruction must have consisted in a transmission, by tradition, of the knowledge of mechanical means, and the properties of remedies, previously employed—as it was conceived, with success—for the healing of wounds and other injuries, and for the removal of disease. Art—rude art—existed; phenomena were observed; but no one attempted to fathom the laws of phenomena, and science was therefore not even generated. Herodotus informs us, that the Babylonians, Chaldeans and other nations of antiquity, had no physicians. When any one was attacked with disease, he was carried into the public thoroughfares, and the passers-by were interrogated whether they had suffered under, or witnessed, a similar affection; and if so, they were required to state their experience, and to recommend such measures as might seem to them adapted for the removal of the malady.

The first individuals, who raised themselves above the vulgar, made the treatment of disease an object of study, and obtained success by practising it, were elevated to the rank of gods. Altars were erected to them; and the priests, from being the oracles of the god whom the people desired to consult, became themselves physicians. Hence, the practice of medicine was, for a long period, a part of priestcraft, and was taught by the ministers of the altars with many occult and mysterious ceremonies, well calculated to impress the vulgar, and to excite a belief in their miraculous powers.

Such was the history of Asclepias or Æsculapius, and the Asclepiades; and if we advert to the mode in which medicine was practised in the temples erected to him, we can readily comprehend the agencies which were concerned in the relief that was so often experienced. In the first place, it was the universal belief, that all diseases were emanations from the anger of the gods. The gods alone could, consequently, cure them; and it was in those sacred places, that Æsculapius manifested the evidences of his extraordinary powers. The ceremonies, used to propitiate heaven in favor of the sick, varied at different periods. They were almost all, however, of a nature to act on the imagination, whilst a strict regimen was rigorously inculcated. The entrance to the temple was interdicted to all who had not previously undergone purification,—the processes connected with which necessarily tended to excite hope in the future, and to inspire the sick with full confidence in the revelations about to be made to them. When permitted to appear before the idol and present their offerings, they found him surrounded by so many mysterious symbols, and witnessed the performance of so many imposing ceremonies, that their exalted imagination made them regard as infallible every oracle of the god. Most of the temples, too, were situated in very salubrious places; and within, or around them, mineral—often thermal—waters flowed. It is, therefore, easy to conceive, that the purity of the atmosphere, and the change of society and scenery experienced by the invalids during their pilgrimage to consult the oracle, may have had a powerful influence on all those affections that we know to be benefited by similar resources. The preliminary ceremonies to which they were subjected, and the sacrifices which were required of them, contributed still more to the same end. In the first instance, the most rigorous abstinence was enjoined. Before they could approach the cave of Charonium they were compelled to fast several days. At Oropus, in Attica, before consulting the oracle of Amphiaraus, they were to abstain from wine for three days, and from every kind of nourishment for twenty-four hours. In leading them through all the avenues of the temple, the priests detailed to them minutely, and mystically, the varied miracles which the god had performed on their predecessors, whose votive offerings and inscriptions they had preserved; and dwelt especially on those cases that resembled theirs.

After these promenades, carefully adapted, in regard to extent, to the powers of the invalid, sacrifices were offered to the divinity, with fervent prayers to obtain from him the revelation, which was not communicated, however, until the patient had been bathed, rubbed, and subjected to various manipulations well calculated to excite a new action in the nervous system and, through it, in the whole system of nutrition. They were subjected, too, to fumigations before hearing the answers of the oracle; went through a process of preparation by prayer; slept in the neighborhood of the temple on the skin of a ram, which had been offered up as a sacrifice, or by the side of the statue of the god,—expecting, as they were taught to believe, the appearance before them of the God of Health. Can we be surprised, that under such circumstances the excited imaginations, of the nervous more especially, might lead them to fancy, and to credit, that the revelation of future events was actually made to them; or that in their dreams, they might believe that they saw Æsculapius present himself before them, and instruct them as to the means to be employed for their cure!

The remedies advised in their dreams or revealed to them by the priests, who were always the interpreters of the dreams, were usually of a kind calculated to do neither harm nor good,—such, for example, as gentle cathartics prepared of stewed currants, diet easy of digestion, or fasting and bathing, accompanied by various mystic ceremonies. Yet occasionally they were of a more heroic character. Aristides—we are told—was the dupe and victim of the Asclepiades for ten successive years. He was alternately purged, vomited, and blistered; made to walk barefoot under a burning sun in summer, and in winter doomed to seek for the return of health by bathing his feeble and emaciated body in the river. All this severity of treatment, he was made to believe, was exercised towards him by the express directions of Æsculapius himself, with whom he was persuaded to fancy that he held converse in his dreams, and frequently beheld in nocturnal visions. On one occasion, the god, fatigued by the importunities of Aristides, ordered him to lose one hundred and twenty pounds of blood, which he very judiciously took the liberty of declining!

After his recovery the patient rendered thanks to the god, and carried him offerings; and, not unfrequently, the parts that had been the seat of the affection were modelled in ivory, gold, silver, or other metal,—a species of votive offering, which was termed *anathema*, and numbers of which were preserved in the temples. Of one of these votive tablets, discovered in the Isle of the Tiber, and published by Gruter, the following is a translation:—

"A blind soldier, named Valerius Aper, having consulted the oracle, received for answer, that he ought to mix the blood of a white cock with honey, and make an ointment to rub the eyes with for three days. He recovered his sight, and returned thanks to the god in the presence of the people."

The exclusive exercise of medicine was confirmed to the priests by other regulations. As soon as a valuable remedy or preparation was discovered, its composition and mode of preparation were inscribed on the gates and columns of the temple. The inventors of surgical instruments also deposited a specimen; and we can thus understand, that useful isolated facts might be collected by competent individuals into a consistent whole; and there is great reason for the belief, that the father of physic was largely indebted to the votive tablets, preserved in the temple at Cos, in the preparation of his immortal works.

The custom of hanging up votive tablets in the temple of the patron saint, after escape from danger of various kinds, has been known in all ages and still prevails in certain parts of the world. According to Scandinavian mythology, the supreme god Odin or Woden—whence our Wednesday, Woden's day—assumes the name of Nicker, when he acts as the destructive or evil principle; hence, perhaps, our term *Old Nick*, as applied to the evil one. In this character he inhabits the lakes and rivers of Scandinavia, where he raises sudden storms and tempests, and leads men into destruction. In short, he is the northern Neptune, or some subordinate sea-god of noxious disposition. Nicker, with the Scandinavians, being an object of dread, propitiatory worship was offered up to him; and hence it has been imagined, that the Scandinavian Nicker became, in the middle ages, St. Nicholas, the patron of sailors, whose aid is still invoked in storms and tempests,—a supposition which receives countenance from the devotion still felt by the Gothic nations towards St. Nicholas. To this saint many churches on the sea-shores are dedicated, and many a prayer to St. Nicholas is still offered up by the seamen passing by. To these churches, in many countries, sailors, who have suffered shipwreck, resort to return thanks for their preservation, and to hang up votive tablets representing the dangers they have escaped, in gratitude to the saint for the protection he vouchsafed them, and in the fulfilment of vows made in the height of the storm. This custom, which is more especially in use in Catholic countries, is probably taken immediately from the ancient Romans, who had it among a number of superstitions from the Greeks; for we are told, that Bion, the philosopher, was shown several of these votive pictures hung up in a temple of Neptune near the seaside; and the custom is referred to by Horace.

> "Me tabulâ sacer
> Votivâ paries indicat uvida
> Suspendisse potenti
> Vestimenta maris Deo."
> Carm. 1, 5.

> "While I, now safe on shore,
> Will consecrate the pictured storm,
> And all my grateful vows perform
> To Neptune's saving power."
> *Francis.*

Such was the condition of medical observation in the then enlightened Greece;—confined to the priesthood, and full of mystery to the uninitiated, but leading to a knowledge of numerous remedial agencies; for there is every reason to believe, that in the earliest periods the ancients had a knowledge of several of our most active remedies,—hellebore, opium, and squill, for example. Bloodletting, too—as we have seen—was employed amongst them. We are told, —and it is the earliest record of the operation,—that Podalirius—one of the sons of Æsculapius—on his return from Troy, was cast ashore on the Isle of Scyros, where he landed, however, in safety; and was taken by a shepherd to the court of King Damœthus. Here, he gave proofs of his medical skill, by curing the daughter of Damœthus—Syrna—of the effects of a fall, by bleeding her in both arms, after her life had been despaired of. In those remote periods—as is too much the case even at present—extensive virtues were assigned to agencies, often of the most inert kind, which frequently obtained the credit of cures, that had been effected by the jugglery of the pagan priests, but partly also by the excellent hygienic rules to which the patient was subjected. At one time, almost the whole of the materia medica consisted of the machinery of magic. Absurd and unmeaning words scrawled on parchment; figures of idols suspended round the neck, were considered to be capable of curing ague; hemorrhage was arrested by charms, and even luxations were said to have been reduced by barbarous expressions and magical songs; and we can understand that Cato, the Censor, may—as was affirmed—have succeeded in this manner; or, in other words, by distracting the attention of the patient by those ceremonies, and seizing his opportunities for such manipulations as might be needed, he may have effected the reduction of a luxated limb. To imagine, however, that he appreciated the *modus operandi* of such ceremonies would be to suppose that he far exceeded in intelligence his contemporaries and successors for ages. Even now—when education has been so extensively diffused—faith is still placed in the protecting power of the amulet; and constantly in the author's attendance on an extensive eleemosynary institution, when it was found important to employ physical diagnosis in chest diseases, he has noticed the protecting amulet worn close to the heart, and as profoundly cherished, and as much faith reposed in its prophylactic virtues, as in the classic periods to which reference has been made. Nay, it is not long since there might be seen advertised in an English newspaper—for the sum of *thirty-five dollars*—a caul, to be worn by one going to sea, to protect him from shipwreck; this caul being the fœtal membranes,

—where the child had been born with them unbroken—dried, and worn by the mariner,—it being supposed, that if the child survived in the midst of the waters, the membranes might likewise prevent him who wore them from being drowned!

Prior to the age of Hippocrates no science of medicine existed. The priests obtained from the votive tablets records of cases and of reputed cures; but we have no evidence, that any attention had been paid to the relation between the symptoms and causes and the morbid condition. Pathology, in other words, was unknown. Hippocrates first endeavored to establish the relation between the various facts observed by him and his predecessors, and to deduce theory or general principles therefrom: hence, he has been commonly regarded as the father of the *rational* or *dogmatical system* of medicine as it was then called. Others refer this sect to Draco and Thessalus, sons of Hippocrates, and to Polybus, his son-in-law; but their illustrious ancestor is doubtless entitled to the paternity.

"Although," as Dr. Bostock has remarked, "we can have no hesitation in pronouncing this to be the correct and legitimate method of pursuing the study of medicine, yet it must be acknowledged at the same time, that it is a method, which, if not carefully watched, and strictly guarded by prudence and sagacity, is exposed to the greatest danger of being corrupted by ignorance and presumption. Hence, we may easily conceive, that it would be liable to fall into the grossest errors, and to lie open to the most serious imputations, and that a fair plea would always be found for exclaiming against the introduction of what is termed theory into the practice of medicine." Thus it was of old: the philosophical principles of Plato and of Aristotle were amalgamated into the systems of medicine,—nay, formed their very bases; experience and observation were rejected, and useless subtleties, which to us at the present day are unintelligible, occupied the attention of the physician.

The absurdities, thus engendered, gave rise, in no great length of time, to a complete revolution, and to the formation of a new sect utterly opposed to the dogmatists, of which Serapion, of Alexandria, was the founder. This occurred shortly after the establishment of the Alexandrian school. Serapion had many followers among the ancients, who were distinguished for their abilities, and were termed *Empirics*. Two rival sects then usurped the domain of medicine —the *Dogmatical* or *Rational*, and the *Empirical*.

As the Dogmatists rejected all experience and observation, so the Empirics held, that the philosophy of the time was foreign to the art of medicine, and that all sound experience must be the result of observation alone. It was deemed unnecessary to inquire into the etiology or causes of disease, except as regarded such as were evident; anatomy was discarded; and the dissection of bodies with the view of detecting the nature of disease was contemned: in short, nothing but the evidence of the senses was admitted as the basis of medical knowledge.

To the latter of these sects, that of the Empirics, which long continued to include all the members of the profession, belonged the learned and classic Celsus. He manifestly, at least, favors the views which the Empirics adopted. Still, his remarks, after a brief consideration of the doctrines of the two sects, are such as every enlightened physician of the present day would be willing to adopt;—that the true rule of practice must be deduced from a proper combination of reason and experience;—that without experience all preconceived theory would be vain and useless, and that by simple experience, without any attempt at generalization, we should frequently fall into gross errors, and be unable to profit even by the best experience. It is difficult, indeed, to imagine how either sect could be able to confine itself rigidly within the rules of its own doctrines. As at the present day, there must always have been dogmatists, who could not consent to reject all observation; and empirics, who felt constrained to theorize.

The Dogmatical and the Empirical were ancient sects; but in all ages, from the periods to which allusion has been made, downwards, there have been physicians who pretended to be guided solely by a rigid attention to observation, and others who indulged in the wildest and most visionary hypotheses, despising all observation: at the present day, however, few would admit, that they reject either reasoning or observation; and it may be safely affirmed that those few are unfit for the practical exercise of their elevated calling.

The closest approximation to the ancient sect of Empirics is the modern French School of Observation. "This school," says an American writer, and able supporter, Dr. Bartlett, "is characterized by its strict adherence to the study and analysis of morbid phenomena and their relationships; by the accuracy, the positiveness, and the minute detail, which it has carried into this study and analysis; and by its rejection, as an essential or legitimate element of science, of all *à priori* reasoning or speculation. The spirit which animates, and guides, and moves it, is expressed in the saying of Rousseau, 'that all science is in the facts or phenomena of nature and their relationships, and not in the mind of man, which discovers and interprets them.' It is the true *protestant* school of medicine. It either rejects as apocryphal, or holds as of no binding authority, all the traditions of the fathers, unless they are sustained and sanctioned by its own experience. It appeals in all things directly to nature, and it asks—not what *may be?* or what *ought to be?* but what *is?*—not *how* things are; or *why* they are? but again *what* they are? Holding that medical, as well as all other, science, should have but one aim and object, to ascertain the actual constitution of things—it professes an entire scientific indifference as to the issue and result of its researches, provided only that this issue and result approach, in the nearest possible degree, to the absolute truth; and it adopts and pursues what it conceives to be the only method and means of accomplishing this end."

Yet schools of this kind have existed in all times, and, from the first moment that a medicinal agent was prescribed, to the present day, physicians have professed to be observers and "to have but one aim and object, to ascertain the actual constitution of things." Of the myriads of remedies brought forward, and too often with exaggerated pretensions, we should scarcely be justified in affirming, that a single one was extolled without the propounder having satisfied himself that such was "the actual constitution of things;" and if it be admitted that a large mass of the recorded "facts," as they have been termed, have been badly observed, it must be equally admitted, that they were accredited results of positive observation; and, therefore, not to be disregarded on light grounds by a school which professes to be a school of observation, *par excellence*—"the true protestant school of medicine, which either rejects as apocryphal, or holds as of no binding authority, all the traditions of the fathers, unless they are sustained by its own experience."

The distinguished head of this modern school, if it may be so termed—the indefatigable and philosophical Louis—would scarcely, however, arrogate so much to himself and his system. To borrow his own language: "It has been acknowledged, from time immemorial, that medicine is a science of observation; nay, it has been said, that it consisted solely in observation,—that is to say, it has been allowed, that nothing can be done in medicine save by means of well-observed facts:"—and the causes to which he attributes the imperfection of medical science are, "on the one hand, imperfect observation, and on the other, the habit of making analyses which are incomplete or dependent upon facts intrusted to the memory."

The great, the crowning merit of M. Louis has consisted in urging and carrying into effect, with a tact, industry, and talent worthy of all commendation, and for which he deserves the gratitude of the profession, an improved system of analysis by the employment of numbers or the calculation of probabilities applied to medicine. To this numerical method the generic name *Statistique Médicale* has been given by certain of the French writers. Originally, the word *statistics* meant the science of states, from the German Staat; but by an extension of signification by no means uncommon, a term which was originally applied only to states, came to be extended so as to comprise, as at the present day, in its signification, the "*numeral* or *numerical method*," that is, numbers employed for the elucidation of any of the sciences of observation; and the term "*medical statistics*" is now as well understood as "*medical jurisprudence*."

The employment of numbers as a means of comparison is by no means new; yet, in consequence of the term "statistics" being of modern origin, it has been presumed by many, that numerical methods were unknown until very recent periods. They have, however, long been used in other branches of science, and their non-employment in medicine, until of late, only shows, that our science has profited but little by the example of the more perfect sciences.

Impressed with the insufficient methods of observation that had previously existed, and were still existing, M. Loüis proposed to introduce as far as possible, the same mode of exact estimation as had been employed in chemistry, for example. "Doubtless," he observes, "this department of learning had many learned men among its votaries previous to the last forty years; nevertheless, it is only within this last period that chemistry has made rapid progress. What means has it employed of late, which were not used before? It has demanded exactness; it has weighed and counted always when it was able to do so. It has taken rigid notice of everything which had any bearing upon a question. It has substituted a strict analysis for an imperfect and careless one. Its methods have been daily more and more precise, and its progress is rapid and constant. The same cause, which kept chemistry so long in its infancy—the want of rigid method—has weighed upon the destiny of medicine, and prevented its growth."

Much has been written, of late years, against the practicability of employing numbers or of *counting* in medicine, notwithstanding the valuable and precise information that has been afforded for ages—even from the time of Ulpian—in regard to the laws that govern the movement of the population, the calculation of probabilities as to the average duration of life, and, at a later period, as a guide to the insurance of lives, &c. &c. What are these but the application of numbers to elucidate the science of life! The nearest approximation to the truth, in regard to facts or observed phenomena, must obviously be deduced in this manner. It is the only accurate mode in which averages can be taken. Every practitioner, in all periods of history, has endeavored to carry in his recollection the precise difference, which he notices from day to day, in the condition of his patient; but this course must be far inferior to the record, that he daily makes approximately by numbers, from which he can deduce his averages. "Averages,"—as an eminent writer, Sir Henry Holland has observed,—"may, in some sort, be termed the mathematics of medical science. It is obvious, indeed, that the value of inferences thus obtained depends on the exact estimate of what are the *same facts*,—what merely connected by resemblance or partial analogy. Pathological results, essentially different, may be classed together by inexact observers, or by separate observers under different views. These, however, are errors incident to every human pursuit, and best corrected by numerous and repeated averages. The principle in question is, indeed, singularly effectual in obviating the difficulties of evidence already noticed, and the success with which it has been employed of late by many eminent observers affords assurance of the results that may hereafter be expected from this source. Through medical statistics lies the most secure path into the philosophy of medicine."

It will not be contested by any one, that facts must be accurately observed before they can be made the basis of calculation. It is clear, too, that averages deduced from a small number of observations may lead us into error. Tables of insurance of lives, calculated from the observation of one or two years, would certainly be fallacious; but all experience teaches that those drawn from the calculation of a long series of years lead to satisfactory results.

The numerical method is, however, more applicable to phenomena presented by the healthy or diseased economy than to therapeutics or the treatment of disease, which, after all, is the end and aim of all our studies. It is, confessedly, the most difficult of the departments of medical science, because in it is concentrated, or ought to be concentrated, a knowledge of every other; and, moreover, it requires—contrary to what has been affirmed by the Empirics—not simply observation, but the constant use of reason, to rectify the erroneous impressions, which imperfect observation,—imperfect, that is without it,—so often occasions. A glance at the history of medicine exhibits, that the science has suffered more from faulty observation than from faulty theories. It will generally, indeed, be found, that theories have been based upon fancied observation. "From the manner," says Dr. John Gregory, "in which empirics in all ages have conducted themselves, it is not surprising, that their writings have tended so little to the advancement of the art; and that, on the contrary, they have had the greatest share in encumbering it with the many falsehoods, under which it has labored so long, particularly that important branch which relates to the effect of medicines. It has been pretended, that such empirical books as I have alluded to may be useful to those who are not bred to the profession, and who wish only to acquire some knowledge of the practical part of physic. But this is so far from being the case, that these are the only people to whom such books are dangerous. A physician of real knowledge and practice may draw instruction, or catch hints, from facts related in an imperfect manner, which will either be useless, or tend to mislead others who have not these advantages. To such, all the circumstances relating to the exhibition of a remedy can never be too distinctly specified."

It is easier, however, to *observe* than to *think*, and hence the number of persons, who restrict their attention mainly to the contemplation and classification of morbid results, without reflecting whether, or in what manner, they may lead to the saving of life or the alleviation of suffering,—without seeming to give a thought, indeed, to these all-important results. Such individuals would carry the science of medicine back to those periods when the ancient empirics "saw without discerning, administered without discriminating, and concluded without reasoning." The mere observer of phenomena, who thinks not, is but the unenviable counterpart of him, who

> "Saw with his own eyes the moon was round,
> Was also certain that the earth was square;
> Because he had journey'd fifty miles, and found
> No sign that it was circular anywhere."

Phenomena are, doubtless, essential to the formation of every science; but the simple observation of phenomena is not science; nor is the observer of phenomena necessarily scientific. He is but the pioneer of science. The collector of a museum of natural objects is a most useful minister; but he may be a mere virtuoso, as the collector of a museum of pathological specimens may be anything but a pathologist. He may be utterly unfit even to classify what he observes, and still more unfit to detect laws of phenomena that may tend to enlarge the boundaries of science. To observe—to proceed one step farther, and to classify—are necessary to the philosopher, who attempts to deduce laws or to constitute a science; but where there are no laws of phenomena, there can be no science, no matter what may be the number of phenomena observed, or the arrangement given to them. This appears to be a self-evident proposition.

In the tentative or experimental methods of the day there is, in all sciences, a marked improvement. Instead of vague and disconnected observations, unsuggested by rational hypothesis, the philosopher now—as he ought always to have done—sets out with a preconceived idea, the result of profound thought, and careful examination of every fact or phenomenon, that can have any—the most remote—bearing on the subject of his inquiry. He observes, and compares the recorded observations of others with his own, and if, after a sedulous examination into every possible source of fallacy, he finds, that the observations confirm, and establish his hypothesis, he correctly infers, that he is justified in regarding that which was at first hazarded as an hypothesis to be a law of phenomena, and a solid addition to science. If, on the other hand, the results of reiterated observation of phenomena do not support—and, *à fortiori*, if they negative—his preconceived hypothesis, he unhesitatingly rejects it, and substitutes another, which has to be subjected to the same scrutiny; and thus he proceeds, until at length he succeeds in framing and establishing one that receives unquestionable support from observation.

Similar views to those of the author, on the nature and methods of acquiring experience in medicine, and on the combination of theory with experience and observation, have been recently forcibly presented by an able writer and thinker. "Experience," says Dr. Laycock, "shows that in medicine, as in every other branch of human knowledge, thought itself is impossible without hypothesis or theory. We instinctively desire to understand all that we observe to occur. No man can be content with mere perceptions; for these are only the *stimuli* to thought. After observation comes comparison with what we already know, and conclusion or inference from the comparison. This conclusion is a theory which would be perfectly true, if the data were complete and correct; but they are not. Our observations are imperfect, our knowledge is imperfect; our conclusion, therefore, reflects the imperfection of our observations and of our previous knowledge, and is never true, but always hypothetical, or theoretical; varying from the truth, just in proportion as we are ignorant or imperfect observers. Having drawn our conclusion—that is, formed our theory—we may or may not rest satisfied with it. If we wisely doubt, then we desire to verify it by observation or experiment; or if the conclusion be as to something attainable, we endeavor to attain, and this is only another way of testing the theory by experience. To theory, then, in this sense, we owe all true progress in knowledge, for empirical knowledge is stationary. If Columbus had not had a geographical theory of dimly-conceived western lands, and the great kingdom of Cathay, he would never have set forth on his voyage of discovery. Without theory, Harvey would not have unfolded the circulation of the blood. Without a theory, the grand laws of the universe would not have been revealed to Newton, and this Newton knew well. Sir David Brewster, in his Life of Newton (vol. 1, chap. 3), gives a history of Newton's discovery of the composition of white light. The student will find in that history an interesting illustration of the uses of theories and hypotheses in research. Newton propounded successive hypotheses or suspicions, and experimentally investigated the phenomena of the prism in reference to each, until he arrived at a satisfactory explanation. Every hypothesis, therefore, except the last was necessarily erroneous; but the investigation of each added to his knowledge, and brought him nearer to the truth."—*Lectures on the Principles and Methods of Medical Observation and Research*, p. 19. Edinburgh, 1856.

On the occasion of almost every introductory lecture to his class, the author has dwelt upon the heresy of trusting implicitly to simple observation, and to merely registering the prominent result; and he has strongly urged a wise combination of *dogmatism* or *rationalism* with *empiricism*—to employ the language of the ancients—before we feel ourselves justified in recording our facts as guides for future action. That a patient has died, or recovered, may be self-evident, and the fact may furnish a datum for the calculations of the medical statistician; but a knowledge of the precise agency of the different remedies employed in any case may demand an intimate acquaintance with the physiological, pathological, and therapeutical bearings of the subject, and, withal, no little power of discrimination on the part of the practitioner. A case or two, placed upon record by distinguished members of the profession, will illustrate more strikingly, by example, the essential difference between the information which simple observation might suggest, and that which would flow from observation conjoined with rational inquiry.

In the next chapter, the author alludes to a well-known case, narrated by Dr. Paris in his Life of Sir Humphry Davy, in which Dr. Beddoes and Davy were about to *try* the effects of the inhalation of nitrous oxide gas for the removal of palsy; but having inserted a thermometer in the man's mouth, and the patient believing that the thermometer was a curative agent, and saying that he felt something better, it was determined to administer no gas, but to repeat the application of the thermometer, and to trust to it alone: this was accordingly done daily for a fortnight, and at the end of the time he was dismissed cured.

Now, in this case, mere empirical observation would have led to the record, that the thermometer under the tongue cured a case of palsy. But the rational therapeutist is not satisfied with a knowledge of the fact, that the disease disappeared after the use of the thermometer. He does not record, that the thermometer is "good" —a common expression—in palsy; but ponders on the mode in which the result was probably induced; and is not long in discovering, that the instrument, in such case, must be classed with those agents, that produce their effects by the new impressions which they make on the nervous system through the external senses.

Another familiar illustration may be given. It is related for an analogous purpose by Dr. Moore, the distinguished author of Zeluco. The story is the prototype of many similar anecdotes that have been told since, and it is not an overdrawn picture of the mode in which experience must have been registered in days of yore; nor is it without its application at the present day, especially to those who, without the observing and logical mind of Louis, consider themselves followers of his system, and rigid recorders of observed results—"sustained and sanctioned by their own experience,"—in their view, the only test of truth.

"A French student of medicine," says Dr. Moore, "lodged in the same house in London with a man in fever. This poor man was continually teased by the nurse to drink, though he nauseated the insipid liquids that were presented to him. At last, when she was more importunate than usual, he whispered in her ear:—'For God's sake bring me a salt herring, and I will drink as much as you please!' The woman indulged him in his request, he devoured the herring, drank plentifully, underwent a copious perspiration, and recovered. The French student inserted this aphorism in his journal:—'A salt herring cures an Englishman in his fever.' On his return to France, he prescribed the same remedy to the first patient in fever to whom he was called. The patient died: on which the student inserted in his journal the following caveat:—'N.B.—Though a salt herring cures an Englishman, it kills a Frenchman.'"—And these were good honest examples of simple observation, of pure empiricism!

A just appreciation of the effects of therapeutical agents, and the determination of their action, whatever that may be, are properly regarded by M. Louis as the most important, and at the same time, the most difficult part of the method of observing. So many disturbing influences have, indeed, to be borne in mind in the estimate, that the inquiry has appeared to some to transcend the powers of the human mind. "We must compare together,"—says that distinguished observer,—"a great number of cases of the same disease of equal severity; some relating to subjects in whom the disease was left to itself; others of individuals to whom certain medicines were given. After doing this, we must study the action of the same therapeutical agent on those in whom the disease was severe, and on those in whom it was slight—on those in whom the remedy has been used in large or small doses, at a period near to, or remote from, the commencement of the disease. This last circumstance is very important. So likewise we must mention, whether the medicine is used alone, or in conjunction with other medicines. But not only does this method require much labor, it supposes also a considerable series of facts, the connection of which is difficult,—especially when treating severe affections, in which we are accustomed to make frequently new attempts, and which will not allow of our remaining a mere spectator of the progress of the disease. For it must be evident, that we do not seek to know, by approximation, what remedies have *appeared* to be more or less successful, but to demonstrate, in a rigorous manner, that a certain remedy, or certain method, is useful or hurtful, and in different degrees, according to the manner in which we employ it."

The necessity for such repeated observations to enable us to make any accurate estimate of therapeutical agencies has been felt and appreciated by every able medical statistician. But it is not easy to multiply observations to the requisite extent. Even M. Louis himself has been censured by M. Gavarret for having ventured to pronounce as to the limited efficacy of bloodletting in pneumonia, erysipelas of the face, and cynánche tonsillaris, on the strength of one hundred cases of the first disease, forty-four of the second, and twenty-three of the third; and the latter gentleman lays it down as an undoubted principle, that every statistical inquiry, in order to furnish admissible indications, ought to consist of many hundreds of observations. Were this indispensable, it would be obviously impossible to arrive at any satisfactory knowledge in regard to the effect of remedies; for, amidst the numerous shades of difference in the manifestations of disease, it would be difficult—if not impracticable—from hundreds of cases of the same malady to find a dozen that are circumstanced exactly alike, and that would, consequently, admit of unquestioned therapeutical deductions.

The marked difference between the amount of information derivable from the system of observation inculcated by the school of Louis, when applied to the manifestations and to the treatment of disease, has impressed all observers. It is signally exhibited in the valuable works which have emanated from that school, even in those of the great master himself. Whilst his "*Researches on Phthisis*" are replete with accurate information on the pathological anatomy, semeiology, diagnosis, termination, prognosis, and etiology of the disease,—on everything that admits of being counted,—the treatment is meagre and unsatisfactory, consisting of little more than a catalogue of curative procedures. No therapeutical information is added to what was already possessed on the subject. These remarks apply equally to the second edition, a translation of which has been issued by the Sydenham Society of London; and they are perhaps even more applicable to a treatise on typhoid fever, which has been published in this country by one of the disciples of M. Louis.

The essential difference between the applicability of the numerical method to diagnosis and to therapeutics is, in a great measure, the cause of the former being often attended to, to the exclusion of the latter; and of the separation of what has been called, by some, the *science* from the *art* of medicine. As a matter of scientific research it might be interesting to understand disease, even if we did not attempt to cure it; but as practising physicians and philanthropists, the alleviation and cure of disease must be the grand desiderata. Yet it has been lamentable to witness the almost exclusive attention, which has been paid, by many, of late years, to diagnosis. In hospital practice especially, the main object of the attending physician has too often appeared to be,—to discover, by physical signs and functional phenomena, the precise disease; and then the treatment has been left to the resident student;—the former priding himself on his skill in, and attention to, the *science*, whilst he leaves to the latter what he considers to be the *art*.

Hematology or observation of the blood in disease at one time usurped the attention of many observers—in France especially—to the exclusion of other important topics of inquiry. Blood was drawn in almost all diseases, in order to detect, by the nicest evaluation, the ratio of its main organic constituents to each other; and after this had been determined, but little attention was, in too many cases, paid to treatment. The same exclusivism was observable, when, a few years ago, pathological anatomy was cultivated as the one thing needful; and when,—in France as elsewhere,—morbid specimens were sought after, collected, arranged, and classified, with a zeal and enthusiasm that had no bounds, and tolerated no opposition. Of late, the zeal for pathological anatomy—excepting that which concerns the tissues—*pathological histology*—has been on the wane: and it will not be surprising, after the numerous mutations that have occurred, if this valuable aid to diagnosis, and in a less degree to therapeutics, should experience the fate of whatever has been supported by exclusivism; and sink as far below its due estimation, as it previously soared above it. Against such a result it behooves every friend of science and humanity to exert himself.

"In the early part of this century,"—says an able reviewer of the "*Practice of Medicine*" of the author, in the *British and Foreign Medical Review*, for October, 1844,—"especially after the publication of the works of Laënnec, the current of the public mind set strongly towards pathological anatomy. Great expectations were entertained from it, and were, to some extent, realized in the improvement of diagnosis. But this result was not of a nature perfectly to satisfy the spirit—essentially utilitarian—of the profession in this country. They might for a time study medicine as an abstract science, but it would only be in the expectation of improvements in the *art* speedily resulting from it. But these results did not necessarily or speedily flow from pathological research. To recognize and name a disease was found to be one thing; to cure it, another: the latter did not flow as a corollary from the former: it occurred as a contingency infinitely more rare than was expected; and disappointment was the result. A change came o'er the spirit of the age: 'we want books useful at the bedside,' was the cry; and, at once, as an indication of the existence of this demand, and as a supply to meet it, the press poured forth 'Cyclopædias of Practical Medicine,' 'Libraries,' 'Dictionaries,' and treatises on the same subject, in rapid succession, from Craigie to Watson. Our transatlantic brethren abate nothing, as is well known, of the practical and utilitarian character of the Anglo-Saxon race, whence they are descended, and were just as likely as ourselves to be soon weary of contemplating and classifying morbid products as some would objects of natural history, provided they led to no tolerably prompt result in the saving of life, or the alleviation of suffering. With them, too, the demand is for therapeutics, and to meet this demand we have (with others) the work of Dr. Dunglison."

The signal difference between the numerical investigation of disease, and of therapeutical agencies must—it is to be apprehended—continue. It may be diminished, but can never perhaps be obliterated. An accurate appreciation of facts—of numerous well-observed facts—is essential to both. A knowledge of the healthy and diseased functions, or of physiology and pathology, and of the ordinary effects of therapeutical agents on those functions, obtained by careful and repeated observation, must be the basis of that enlightened theory, which necessarily leads to enlightened practice; and great mischief would result to both, were we to discard all rational therapeutics, and restrict ourselves to mere observation. The complex functions, executed by the human organism, are so modified by multitudinous external and internal influences, which are inappreciable; so much agency is perpetually exerted by the *moral* over the *physique*, that no comparable facts can be obtained, in sufficient number, to admit of any accurate numerical deduction; and, consequently, we must either treat disease in accordance with principles suggested by conjoined observation and reason; experiment for ourselves *ab initio;* or resign our faith to the asserted observation and experience of others;—and of these, which of the legion shall we select as masters? It is fortunate, that we are possessed of such principles in medicine. Without them we should be unable to meet morbid manifestations, which present themselves to us for the first time. "He,"—says Dr. Abercrombie,—"who follows certain arts or practical rules, without a knowledge of the science on which they are founded, is the mere artisan or the empiric; he cannot advance beyond the practice rules which are given him, or provide for new occurrences and unforeseen difficulties."

These great principles are the same everywhere, and by their possession we can combat disease wherever we meet with it; amongst the equatorial heats, or the Siberian snows; in the scorching presidencies of British India, and, *à fortiori*, in every portion of this wide-spread country; on the lofty mountain and in the lowly valley; in the pestiferous locality on the banks of the Mississippi, and in the more salubrious region where malarious influence is unknown. It is by their possession, that the medical officers of the army and navy are able to manage the diseases of all climes, when opportunity is afforded them for adequate observation. That diseases are modified by climate or locality cannot be doubted; but the well-instructed physician speedily seizes hold of the peculiarity.

It may be inferred, then, that from every passing sect or system; from every curative observance, rational or empirical, the judicious therapeutist may extract something that may tend to the advancement of the science, and the extension of his sphere of usefulness; and that it is the duty—as it ought to be the pleasure—of the philanthropic physician to adopt every improvement, no matter from what source it may emanate. To attempt, by the active opposition of the profession, to arrest even quackery of the most contemptible kind, in its career, would be futile:—nay more, the opposition is apt to be regarded by the laity as persecution, and persecution suggested by interested and sordid considerations. The human mind, moreover, is so constituted, that it loves mystery; and reposes more faith in that which is hidden—if unblushingly proclaimed—than in the most open and candid exhibition of really potent agents. All that is left, therefore, is for the profession, in every case, to wait until the mystery has been removed, and then to endeavor to appreciate and embrace the good that may flow from it.

Such is the view which reason and philanthropy would compel us to adopt; and if there be anything perhaps that distinguishes the present condition of the medical mind from the past, it is the disposition of the wisest members of the profession to admit those principles more as rules of action than they did formerly.

It behooves the student to observe well for himself,—carefully, repeatedly; yet to discard not the observations of others; to reject not at once as apocryphal, or to hold as of no binding authority, all the traditions of the fathers, unless they are sustained and sanctioned by his own experience; but rather to respect them, and believe it possible that his own observation may have been defective. Under such feelings, let him subject them, on the part of himself and others, to repeated scrutiny; and then, but not till then, abandon them, should they appear to be wanting in accuracy. Let him imbue himself profoundly with the great principles of physiology and pathology,—simple and applied; regard pathological anatomy as an aid, but an aid only, to diagnosis and therapeutics; endeavor to comprehend well the action of his remedies, and the great principles of general therapeutics; and thus fortified and guided by all the lights, which illumine the profession in its present advanced and advancing condition, he will be enabled to shine as the well-informed, observing, and rational practitioner, happy in his own resources, and a blessing to the community whose confidence is reposed in him.

CHAPTER II.

CIRCUMSTANCES THAT MODIFY THERAPEUTICAL INDICATIONS.

Age — Sex —Original conformation — Habit —Tolerance — Climate — Mental Affections — Races, Professions, and way of life—Causes, seat, period, &c., of the disease.

Having briefly alluded to the great principles that ought to guide the physician in laying down his indications of cure, it will be proper to glance at some of the chief circumstances that contribute to modify those indications in the treatment of disease. In all cases, general principles are to guide the practitioner, but as he has to treat individuals, circumstances may be connected with them which demand important modifications.

The circumstances of a modifying nature are many. Some are connected with age, conformation, sex, professions, habit, &c.; others with the causes, seat, intensity, period, &c., of the malady.

1. *Age.*—This has considerable influence, especially as connected with the different evolutions which the system experiences in the progress of life, and which give occasion to diseases at one period of existence, that do not occur at others, and thus modify both the rules of Hygiene and Therapeutics.

In early infancy, there is great nervous susceptibility or impressibility, so that mischief is liable to be produced in the encephalon by slight irritations. On this account, before and during the period of the first dentition the surgeon avoids performing any operation which he is not compelled to undertake. For the same reason, dentition itself is the cause of many phenomena of a sympathetic character, which can often be relieved only by attending to the condition of the gum. Irritation in the intestines is also the cause of many morbid affections; and the nervous impressibility, before referred to, causes them not to bear narcotics well. Again, under two years of age, large quantities of mercury may be given without the supervention of the ordinary effects of the medicine on the system. It is extremely difficult to salivate a child under two years of age ; and yet at three, and afterwards, it is easy. This must be dependent upon some evolution, or different condition of the absorbent function, which is inappreciable in the present state of our knowledge. The mortality at this period of existence is very great, one-third of the whole number of deaths in our cities occurring under two years of age. In addition to the great tendency to disease of the cerebro-spinal axis, we find in summer a disposition to erethism of the skin and mucous membrane of the bowels; and in winter to a similar condition of the mucous membrane of the pulmonary apparatus: accordingly, cutaneous eruptions, aphthæ, diarrhœa, cholera, croup, bronchitis, &c., are common at this age, owing to the susceptibility of the dermoid tissue to disease; and convulsions, hydrocephalus (encephalitis), and other head affections, owing to the impressibility of the nervous system. During the whole of this period, a predominance of acidity is manifested in the stomach, either owing to an undue secretion of the acids met with in that organ in health, or to the reaction of the elements of the food on each other, or to both; and hence antacids are indicated, as well as occasional laxatives. The state of erethism in the mucous membrane of the intestines lays the foundation, in scrofulous habits, to mesenteric ganglionitis, and to consequent tabes mesenterica, in the same manner as a wound in the hand or foot occasions axillary or inguinal ganglionitis.

Between the age of the first dentition and puberty, including the whole of childhood, the liability to the affections that were so fatal during the first two years of existence becomes amazingly diminished; and the peculiarities of the earliest stage of existence gradually, and totally, cease.

At, and after, the age of puberty, a surprising change is observable. A complete revolution has been effected in the economy by the development of the generative apparatus. The morbid tendency is now to the lungs; and consumption—that dread disease, which, in these climes, is estimated to destroy at least one-sixth of the population—is rife.

During the whole period of virility no particular modification is produced by the evolution of organs. All goes on with greater uniformity, so that no new morbid tendency seems to be developed. It is the standard period for all our physiological and therapeutical descriptions, unless otherwise specified. If we speak of the dose of a medicine abstractedly, we mean the quantity usually needed by an adult male to procure the ordinary effects of the drug.

Lastly:—in old age, the nervous susceptibility becomes in general, diminished, so that larger doses—of particular kinds of remedies at least—are needed, and a greater supply of food is demanded, in order that the enfeebled powers of chylosis may be able to extract from it the adequate supply of chyle. The torpor of the intestinal functions is at times so great, that the excrement collects in quantities in the lower part of the bowels, and occasionally it becomes so much indurated, that mechanical means,—as enemata, or the use of a scoop,—are needed for its removal. The tendency, too, to disease of the urinary organs, and especially of the prostate and bladder, is considerable at this time of life, and but few individuals attain the age of eighty without being more or less incommoded in this manner.

Connected with the pathology of old age, M. Bégin has laid down the too general law,—that in the greater part of old people, disease is the result of chronic irritations, produced in the organs by the long-continued repetition of the stimulations that accompany the normal exercise of the functions. This is improbable. It cannot readily be conceived, that any continuance of healthy stimulations should bring on disease in these or other parts. In the exhausted condition of the nervous agency, obstruction or irregularity of action is apt to be induced; and such obstruction, or morbid depositions, dependent upon irregularity of action, may thus become the source of irritation, and organic disease. All the morbid affections, indeed, of old age, are irritative, as at other ages. Chronic gastritis, ascites, enlarged liver, visceral engorgements, chronic bronchitis in all its forms, asthma, angina pectoris, chronic affections of the heart in general, are diseases of irritation, originating in some irregularity, or in debility of the organs implicated, but not in their simple continued healthy action.

At all ages, then, the treatment of disease must be, in its general principles, the same; but it requires to be varied according to the strength of the individual, and the evolution of the organs at different periods of existence.

2. *Sex.*—Prior to the period of puberty, there are but few points of difference between the sexes, as far as relates to therapeutics. From organization, there is a greater mobility and impressibility in the nervous system of the female, but this is not manifested before

she becomes nubile, or before the genital apparatus has experienced the evolution that befalls it at puberty. After this, all the functions are apt to be modified by the new condition of the uterine organs. A periodical discharge is established, and if this be in any manner interfered with, the organic irritation, which ought to have existed in the ovaries and uterus, is transferred to other parts, and the one most predisposed to take on morbid action assumes it. Hence it is, that attention has always to be paid to the state of this function, when the therapeutist is called upon to examine diseases of other parts, that may be obscurely connected with the uterine functions, through the extensive sympathy which they maintain. This is signally shown when the catamenia do not appear at the usual age; or when, after having occurred regularly, they become obstructed. Whilst, too, they are flowing, the female is generally extremely impressible, so that active remedies—especially such as affect the lower part of the bowels, or the urinary organs, and excite the uterus through contiguous sympathy—have to be used with caution.

The period at which the catamenia cease is also one of interest to the therapeutist. The female is then so proverbially liable to irregularity in the functions, and in the nutrition of organs, that it has been called—even by the unprofessional—"the critical period." Prior to their total disappearance, the catamenia may recur irregularly; and chronic irritations be thus developed in the sexual organs, or elsewhere. The mammæ, having lost the sympathetic influence exerted between them and the uterus, are apt to assume a morbid condition, and to become the seat of irritations of a specific kind—as of cancer—which appeared to be previously held in check by the play of the healthy sympathies. Yet, although the female is more liable to disease at this time, it would not seem from the results of statistical inquiry that the absolute mortality is increased.

It is obvious, then, that the state of the uterine function must be an important object of inquiry in many of the diseases to which the sex is liable; that when the catamenia are present, the flow must not be officiously interfered with; and if modified, either owing to the proper periodical irritation having been arrested, or to the flow occurring in too great quantity, appropriate measures for altering these conditions must be had recourse to.

At one time, it was universally presumed, that hysteria is occasioned altogether by the state of the uterus, and hence its name, from *ὑστερα*, "the uterus," and the German name—Mutterkrankheit or "womb disease." It occurs, however, in man; is essentially a disease of the nervous system, and probably prevails more in females only because they possess greater mobility, and irritability of the nervous system,—doubtless often developed by the particular condition of the uterus reacting on the nervous system, but appearing—as in the male—where no such influence can exist.

The presence of the uterine system constitutes, therefore, a main difference in the indications to be laid down for the treatment of female diseases, as well as the mode of fulfilling those indications;

and in all cases the therapeutist has to inquire carefully, whether that system be primarily or secondarily affected. In many cases of functional aberration of the uterus, he will find, that the cause is seated in the state of the general system, or in some other part of the organism; and the case may be much complicated by the reflection of the uterine irritation to other organs.

After all, however, the treatment of the majority of the diseases that attack females as well as males must be based upon the same great general principles;—the chief modifying circumstance to be borne in mind being, that the female is more susceptible of impressions than the male, and consequently, as a general rule, does not require the same dose of any remedial agent, although the same agents may be demanded. In managing diseases that are of a sexual character, this great modifying circumstance has to be recollected.

In the anomalies that occur at the commencement, or cessation of menstruation, the pathologist must be guided by his acquaintance with the laws of physiology and pathology, and establish his indications accordingly.

The state of utero-gestation is a point, connected with the female, which demands consideration. The various sympathetic disorders, that may arise, have to be palliated by the most gentle agents. The original cause being seated in the gravid uterus cannot, of course, be removed, and palliation alone remains. No violent medicinal agents can be prescribed without hazard. Powerful excitants are especially objectionable; and hence the hot bath cannot be used with impunity. Anything that interferes with the due nutrition of the fœtus in utero, or that can give occasion to uterine contraction, is obviously improper. It is necessary, also, to bear in mind, that the blood of the pregnant female usually presents the buffy coat, or that appearance, which has been so generally regarded as the universal product of inflammation as to be called the "inflammatory crust;" and it is still maintained by some, that this crust on the blood of pregnant women only appears when inflammatory irritation exists. Certain, however, it is, that we witness it where there are no other signs of inflammation. When the crust occurs in inflammation, the ratio of the fibrin to the red corpuscles appears to be increased; and there is a greater aggregation between the particles of the fibrin and between the corpuscles themselves; the fibrin is longer in coagulating, and time is thus allowed for the subsidence of the corpuscles to the bottom of the vessel. The fibrin, devoid of red corpuscles, then forms the upper crust or stratum, which is the *buff.* In like manner, it might be understood, that under the new draughts, which are indirectly made from the maternal blood during pregnancy, its condition may be modified so as to give rise to the phenomenon in question.

As a general rule, the pathologist regards the appearance of the crust on the blood as a strong proof of the presence of inflammation; and, when he would otherwise have remained in doubt, is encouraged, by this sign, to repeat bloodletting. In pregnancy, such an inference from the appearance of the blood drawn might, for the reasons stated above, be erroneous; yet in many parts of this country, it is not unusual for a female to be bled five or six times during the period of pregnancy;—often three or four times; and if blood should not have been drawn, and any unfortunate event should occur, it is apt to be ascribed to a neglect of this fancied prophylactic. It is strange that a process, which every one would readily admit to be natural in the animal, and to require no remedial means, should be regarded as pathological in women. The notion has, however, been encouraged by some of the medical profession of no little celebrity, especially by Sauvages, who places pregnancy in the order *Intumescentiæ* of his Nosology; and by Linnæus, who ranges it under *Tumidosi* (morbi).

During the period of nursing, the practitioner has to attend to another circumstance. The action of his medicinal agents may not be confined to the female: the infant at the breast may be affected likewise. Absorption is active, in consequence of the constant secretion of the mammæ, and certain substances may, therefore, be taken up in sufficient quantity to affect the child injuriously.

3. *Original Conformation.*—There are many circumstances, connected with original conformation, which exert a modifying influence, both hygienically and therapeutically. Singular as it may seem, it is indubitable, that from the moment of a fecundating copulation, the new being is impressed with an impulse, which gives occasion to such a formation as may predispose the offspring, at some period of its existence, to a disease that affected the male or the female parent. In this way, a conformation may result, which may favor the development of consumption, apoplexy, or scrofula, at certain ages, under the action of adequate exciting causes. Hence it is, that we find so much difference in the *constitutions* of different persons. The constitution of an individual is the organization proper to him; and he is said to have a strong, or a delicate, a good, or a bad constitution, who is apparently strong or feeble,—usually in good health, or liable to repeated attacks of disease. The varieties of constitution are, therefore, as numerous as individuals. A strong constitution is considered to be dependent upon a due development of the principal organs of the body, on a happy proportion between those organs, and on a fit state of energy of the nervous system; whilst a feeble or weak constitution results from a want of these postulates: but it is obvious, that our knowledge on this matter must be somewhat limited, although, by careful examination, we may be able to appreciate or rather to approximate it.

It is daily observed in our intercourse with man, in a state of health or of disease, that certain persons possess much more irritability or impressibility than others. This irritability or impressibility is connected with the nervous system, and through it every tissue of the body may be affected, by virtue of the contractility or excitability which it possesses. Men certainly have very different degrees of nervous energy, and of susceptibility to impressions; and, consequently, great diversity in the degree to which they are predisposed to disease, and in the action of remedies. Persons of very great nervous susceptibility are sensibly alive to atmospheric vicissitudes; have the *Cœnæsthesis*, or "common feeling"—Gemeingefühl of the Germans—extremely acute; are languid, listless, and depressed in a lowering atmosphere; buoyant, and elastic, or "corky"—to use the language of the "trainers"—when the air is dry and serene. We see the same variety in the way in which powerful emotions, or impressions on the senses, affect different individuals. Some persons faint from the slightest shock made on any of the senses; others are thrown into convulsions by causes, which, in others again, would excite no perceptible emotion. The over-excitement of a nervous individual concerns us materially in the employment and effects of our therapeutical agents. With such individuals, the slightest cause may produce fever, owing to the irritation of the nervous system extending to the vascular, and causing in it augmented action. Usually, the febrile irritation, thus induced, is only ephemeral; but if there be any part of the capillary system, owing to obstruction, or morbid derangement, strongly predisposed to assume the inflammatory condition, such a condition may be induced by the force with which the blood is propelled by the heart and arteries. The circulatory system is not *directly* influenced by the brain or spinal marrow, but it is so *indirectly*. We see this in the effect of emotions. The heart leaps with joy; and under the influence of certain passions its actions are hurried and unequal. Nay, the effect extends even to the small vessels,—to those through which secretion is effected in the glandular system. At the sight of a cherished article of food, the salivary glands secrete so rapidly as to cause the "mouth to water," and the saliva to be projected to a distance from it.

It is an important principle, not to be lost sight of in Therapeutics, that the condition of the circulatory is largely influenced by that of the nervous system; and it is especially important to bear this in mind in the management of febrile and inflammatory diseases. If bloodletting be pushed to a very great extent in such cases, it induces irregularity of action, and impressibility of the nervous system, and in this way local determinations and hyperæmiæ may be, and often are, caused by the very means employed to obviate them. This effect of copious loss of blood is instructively exemplified in uterine hemorrhage. A female, after delivery, may be reduced to death's door by the profuse discharge of blood. She may be almost pulseless, pale, and exanguious; and yet, in the course of a few hours after she has rallied, the most violent determination may take place to the head—as indicated by intolerable cephalalgia, and violent throbbing of the carotid, and temporal arteries,—a state induced by the irregularity above described as apt to be engendered by that irritability of the nervous system, which follows a profuse discharge of blood. In such a case, farther bloodletting obviously cannot be indicated. The irritability of the nervous system must first be allayed; and accordingly, the author has found the most decided advantage from the use ot opium, administered in such a dose, and in such a form, as to insure the speedy production of its full sedative influence. When this begins to be exerted, the activity of the encephalic circulation gradually yields; and in a short time the whole mischief disappears. If bloodletting be had recourse to,—even to a moderate extent, and it could not be carried far in this reduced state of the system,—it is calculated to augment the pathological condition which it was intended to remove. The advantage attending a union of copious bleeding with sedative doses of opium can thus be readily appreciated. The abstraction of blood reduces the amount of stimulus in the sanguiferous system, whilst the opium keeps down the excitement of the nervous system.

In particular diseases, the nerves are remarkably susceptible to impressions. In neuralgia faciei, the slightest motion of the muscles—the least breath of air—induces excruciating torment; and in hydrophobia, the distress and horror are chiefly occasioned by the impression of certain objects on the organ of sight. Some persons, again, suffer much more from pain than others. This is the case with different animals. The idea, that the beetle, when trod upon, feels as much as the giant when he dies, is poetical but clearly untrue. Some persons are thrown into the greatest nervous distress —the most intolerable anguish—by the application of a blister; and it is well known, that all do not bear surgical operations equally well. This is doubtless greatly dependent upon organization, although it may be modified by habits of endurance, or the contrary. The state of the mind exerts a powerful influence in this respect. The religious fanatic, and the martyr to political excitement, have exhibited a resistance to physical agents almost incredible.

The condition of the nervous system can never be wholly disregarded by the therapeutist. Whenever it is morbidly impressed, the operation of medicines is interfered with; and regular physiological actions may be modified. This last effect is often exhibited in the parturient female. Labor may have been proceeding in the most favorable manner, but if anything should interfere with the attendance of the practitioner who has been expected, and another should present himself; and still more, if the latter should have an unprepossessing appearance, the pains may subside, and delivery be greatly retarded; whilst if the accoucheur, in whom the female had reposed her confidence, had presented himself, the termination might have been much facilitated. Dr. A. T. Thomson gives the following anecdote as illustrative of the control of the mind over the operation of medicines, where the whole effect must obviously have been induced through the nervous agency modifying the functions of the organs concerned. A lady was laboring under an affection of the bowels, attended with severe pain and the most obstinate costiveness. She was bled; the warm bath, and fomentations were frequently resorted to; and purgatives and various anodynes were freely administered, but without the least effect upon the bowels, and without either sleep, or any diminution of pain ensuing. At length, the physician in attendance was informed that she had expressed her conviction, that her usual medical attendant, who was in the country, alone understood her constitution, and was the only person who could relieve her. This gentleman was accordingly sent for; and although no change, either of measures, or of medicine was resorted to, the bowels were quickly moved; sleep, and cessation of pain followed, and in a few days the patient was convalescent. He further remarks, that he has witnessed frequent illustration of this influence of mind in modifying the effects of medicines, in the treatment of gonorrhœa contracted by married men; or by young men, possessed of a high feeling of moral rectitude. The anxiety of such persons to be speedily cured occasions the mind to be constantly directed to the seat of the disease; and more or less erethism is thus induced there which renders the cure difficult. Dr. Thomson thinks, that "a vascular fulness of the mucous membrane, and a state resembling chronic inflammation" are thus superinduced, which resists the influence of medicines, that would readily cure the disease in those in whom it was a matter of less anxiety, and little mental reflection. It is obviously, therefore, of moment, in all affections, particularly in those of an inflammatory character, that the mind should not be permitted to brood over the malady; and that every endeavor should be made to withdraw the nervous influence from the part affected, as far as this can be done with propriety. It is in this way, that revulsive application sexert a portion of their beneficial agency. They not only excite the parts to which they are applied, so as to break in upon the morbid catenation elsewhere existing, but they attract the attention; and the nervous influx which would otherwise be directed towards the suffering organ is diverted towards the part artificially irritated.

Much stress has been placed on the influence of *temperament* in a pathological as well as therapeutical point of view. The subject of the temperaments, usually admitted, belongs to physiology. The *sanguine;* the *bilious* or *choleric;* the *melancholic* or *atrabilious;* the *phlegmatic*, *lymphatic* or *pituitous*, and the *nervous* are generally received and described by writers; but if we attend to their reputed characteristics, the imperfection of their definition and demarcation is obvious; so imperfect, indeed, are they, that it is very rare for us to meet with an individual, whom we could unhesitatingly refer to any one of them. They are likewise susceptible of important modifications from climate, education, &c., and may be so combined as to constitute innumerable shades. The man of the strongest sanguine characteristics may, by misfortune, assume all those, of a mental character particularly, which are looked upon as indexes of the melancholic or atrabilious; and the activity, and impetuosity, ascribed to the bilious temperament, may, by slothful indulgence, be converted into the lymphatic or phlegmatic. All these temperaments acquired their names from a fancied predominance of certain humors, which so tempered the different functions as to communicate corresponding characteristics. In a therapeutical consideration, they do not demand much attention, except perhaps so far as regards the two opposite—the *sanguine*, and the *melancholic;* and perhaps the *nervous*. The first of these is presumed to be dependent upon a predominance of the circulatory system; and hence is considered to be characterized by a strong, frequent, and regular pulse; ruddy complexion; animated countenance; good shape, although distinctly marked; firm flesh; light hair; fair skin; blue eyes; nervous susceptibility, attended with rapid *successibilité*, as the French term it,—that is, a facility of being impressed by external objects, and of passing rapidly from one idea to another. On the other hand, in the melancholic temperament, the vital functions are considered to be more feebly or irregularly performed; the skin has a deeper hue; the countenance is sallow, or sad; the bowels are torpid, and all the excretions tardily accomplished; the pulse is hard, and habitually contracted. In the nervous temperament, again, the susceptibility of being acted upon by external impressions is unusually developed. It is characterized by small, soft, and, as it were, wasted muscles; and generally by a slender form, and great vividness of sensation.

Such are the characters ordinarily assigned to the temperaments. Many of them are fallacious, and but few need be borne in mind in therapeutical investigations. As a general rule, it certainly would seem, that persons of strong sanguine characteristics have the nervous system more impressible; the body more predisposed to inflammatory action, and the vessels less protected by the tissues in which they creep; hence they are more liable to obstructions, as well as to hemorrhage by rupture or transudation; and it is manifest, that in such an organization antiphlogistics may be more demanded, and stimulants ought to be employed with more caution, than in that of the melancholic. Again, the possessor of the nervous temperament may demand modifications of management, both hygienical and therapeutical, which may not be suggested in those of any of the other temperaments.

After all, however, we cannot deduce much instructive matter, for our practical guidance, from the study of this subject; nor does it seem to the author, that the doctrine of the temperaments in any of its relations—physiological or psychical—hygienical or therapeutical—is worthy of the consideration that has been bestowed upon it. In therapeutics, the nature of the diseased action going on in an organ is the great object of study; and if our thoughts are distracted from this, and directed to temperaments or tendencies, we may often be greatly misled. Many years ago, the author was requested to visit a lady for the first time, in the absence of the regular physician, who had long attended her, and had become what is called "acquainted with her constitution." She was laboring under profuse metrorrhagia, which had continued for some time, and had completely prostrated her; she was deadly pale; lips blanched; pulse scarcely perceptible; and every evidence present, that the hemorrhage was not continuing from activity of vessels; or, at all events, that the idea of activity must be laid aside in the treatment, and the powers of life be supported,—otherwise she would sink.

The uterus was in an unimpregnated state. The usual means with the tampon were adopted successfully, so far as regarded the immediate flow; and a tonic system of medication was recommended, under which the hemorrhage did not recur during the day. In the evening, the family physician arrived, who finding her in a comfortable situation, and evidently improving, discontinued the tonics, under the apprehension, from his knowledge of her sanguine temperament, that violent reaction and consequent mischief might ensue; but in the night he was called up, owing to the alarming recurrence of the hemorrhage, and was glad to have recourse to the management, which had previously proved successful; under which she ultimately recovered, and since that period—thirty years ago—has had no return of the disease. In this case, a "knowledge of the constitution" was likely to have been attended with disastrous results. The diseased condition is, indeed, the point to which attention has to be directed; and it is the only one that can, in general, fall under the personal observation of the physician, in the mode, at all events, in which the profession is regulated in England. The apothecary is there the family practitioner, and the physician is only called in consultation; so that the chief part of the practice of the latter must necessarily occur in persons with whose constitution he has had no opportunity of being previously acquainted.

Temperament is conformation, but *Idiosyncrasy*—or the peculiar disposition which causes an individual to be affected by extraneous bodies, in a way in which mankind in general are not acted upon by the same agents—may be acquired; and when once it has been so, it is apt to continue, and frequently does so, throughout the whole of existence. The author possesses a singular idiosyncrasy. If a piece of thin biscuit, or oaten-cake, be broken in his presence,—nay, the idea of the action is sufficient,—the muscles, that raise the left angle of the mouth contract irresistibly. It is obviously of moment, that the practitioner should be acquainted with all idiosyncrasies or peculiarities, and so far the notion of "knowing the constitution"—which is apt to be used to the prejudice of the young practitioner, or of any except the accustomed medical attendant—carries reason with it. But it is the duty of the patient to put the practitioner in possession of the fact of such peculiarity, so that he may be enabled to guard against it, and not take that for morbid, which is the effect of simple idiosyncrasy.

By virtue of these peculiarities, medicines often produce effects diametrically opposite to those which they ordinarily exert. The author knows a gentleman whom opium purges; yet this drug is usually administered to check inordinate action of the intestinal tube. Mr. Chevalier gives the case of a lady, who could not take powdered rhubarb without an erysipelatous efflorescence showing itself, almost immediately afterwards, on the skin; yet, what is singular, she could take it in the form of infusion with perfect impunity. It is impossible for the physician to detect these peculiarities by any signs. His information has to be wholly derived from the patient. But when once acquired, he is expected to retain it; and, strange as it may seem, all confidence in him is at times annihilated, because he may not have recollected that oil of peppermint, or some other trivial agent, was in the habit of disagreeing with his patient. It is apt to be regarded as an evidence that he did not attend sufficiently to the constitution; and the inference is drawn, that without this, his endeavors could not have secured the full amount of success, whilst his inattention might have been productive of injurious effects, owing to the irritation that might have been induced, by the development of this adventitious sympathy, in a frame already disturbed by morbid influences.

There are few functions of the body that are altogether free from idiosyncrasies. An acquaintance of the author cannot be present where ipecacuanha is being powdered, without the most violent catarrhal and asthmatic symptoms being produced; and many similar cases are recorded. The smell of the calycanthus is so disagreeable to another as to be almost intolerable. Pope Pius VI had such an antipathy to musk, that on an occasion of presentation, an individual of the company having been scented with it, his holiness was obliged to dismiss the party almost instantaneously. These are idiosyncrasies or peculiarities connected with smells, which are agreeable to the generality of mankind. On the other hand, by some, offensive smells are preferred. The author knew a lady, who always perfumed her snuff with assafœtida; and Louis XIV is said to have preferred the smell of the urine of the cat to that of the rose. Some persons, again, cannot take peppermint, and, with many, opium disagrees, producing the most intolerable headache, nausea, and vomiting, and exciting no anodyne effect whatever. Dr. Thomson refers to the case of an individual, who was always attacked with syncope when he took the smallest dose of calomel. But peculiarities of this kind are innumerable; and the practitioner ought to be put in possession of them by his patient; otherwise disagreeable results may take place; the economy be needlessly disordered, or effects, opposite to those which the article usually induces, follow. Several such peculiarities are referred to in the author's *Human Physiology* (8th edit. ii, 664. Philad. 1856).

The different impressibility of the nervous system in different individuals is often exemplified, in practice, in the effect produced upon the circulation by the appearance of the physician. The pulse of a delicate female, under such circumstances, is often quickened 20 or 30 beats in the minute; a fact which the physician must bear in mind, or he may ascribe to disease what is the mere effect of idiosyncrasy. In some persons, the pulse is unusually slow. The ordinary number of beats of Napoleon's was 44 in the minute; the author knew one 36; and Lizzari refers to one, which did not number more than 10: but it is *possible*, that in this case there might have been intermediate beats unperceived by the observer. On the other hand, some individuals have the pulse much quicker than ordinary. Seventy beats in the minute is about the average in the healthy male; but at times the number in health is as high as 90 or 100. The pulse of the aged is generally more frequent than that of the adult, and is irregular, or intermittent; but it is occasionally unusually frequent and regular. A change of this kind occurred to a valued friend of the author, who had filled the highest office in the gift of his countrymen. Until about the age of 80, his pulse possessed the usual character appertaining to that of the aged; but, for some years before his death, it became quicker,—beating nearly 90 in the minute, and more regularly than it had done. During early childhood, the same intermittent and irregular character exists in health; but the pulse is faster than in the adult. As a general rule, at birth, the number of pulsations may be from 130 to 140; at one year, 120; at two years, 110; at three years and up to ten, 90 and upwards; at puberty, 80; at the adult age, 70; and in old age, something higher. In the female, the pulse is on the average from five to ten beats quicker than in the male.

All these circumstances have, of course, to be borne in mind in investigating any case of disease. But, owing to such individual peculiarities, it becomes, at times, extremely difficult to pronounce upon the existence of a morbid condition from the pulse,—more especially as regards its degree of quickness or slowness,—inasmuch as we are rarely acquainted with the number of beats in the state of health. It is partly on this account, that Celsus termed it "*res fallacissima;*" yet, it has even been made the ground of discrimination in a case of suspected insanity, and by an illustrious native of this country, whose eminent abilities were at times obscured by his unbounded enthusiasm, and too prolific imagination. In counterfeited insanity—Dr. Rush remarks—the pulse will be natural; whilst in real insanity—and the fact has since been established by observers—it is generally more excited than in a state of health. Dr. Cooper has introduced this into his collection of "*Tracts on Medical Jurisprudence,*" as a fixed and invariable law;—to which, at least, he has not attached any doubt or exception. "The knowledge of this fact," adds Dr. Rush, "has once been applied with success in the administration of the criminal laws of the United States. One of the two men who were condemned to die for treason, committed against the general government in the western counties of Pennsylvania in the year 1794, was said to have lost his reason after sentence of death had been pronounced upon him. A physician was consulted upon his case, who declared his madness to be feigned. General Washington, then President of the United States, directed a consultation of physicians upon his case. Dr. Shippen, Dr. Samuel P. Griffits, and myself were appointed for that purpose. The man spoke coherently upon several subjects; and for a while the state of his mind appeared doubtful. I suggested the propriety of examining his pulse: it was more frequent by twenty strokes in a minute than in the healthy state of the body and mind. Dr. Shippen ascribed this to fear. I then requested that the pulse of his companion in guilt and fear might be felt. It was perfectly natural in frequency and force. This discovery induced us to unite in a certificate, that the man, who was only supposed to be mad, was really so; in consequence of which his execution, as well as that of his companion, were suspended for two months; in which time the popular clamor for their lives so far subsided, that they were both pardoned by the executive of the United States." This is perhaps the *ne plus ultra* of medical philanthropy, certainly not of medical science!

From all that has been said, it is manifest, that idiosyncrasy must have much power in modifying the operation of medicines. It is, consequently, important for the practitioner to be aware of this; and it may not be amiss for him to make specific inquiries when he wishes to administer such drugs as are apt to disagree with certain individuals,—of which opium and its preparations, and calomel, are perhaps the most prominent.

4. *Habit.*—By this is understood an acquired disposition in the living body, become permanent, and as imperious as any of those primitive acts, which have been also, in another sense, denominated *habits*. When a function is over and over again exerted to the utmost extent of which it is capable, both as regards energy and activity, or is exerted beyond the ordinary extent, it becomes more and more easy of execution; the organ is better adapted for its production; and, it may become so habituated to this over-exertion, that a real want may be engendered, a "second nature," and the individual may feel uncomfortable, unless the organ is subjected to the accustomed action. In the same way, by habit, the action of an organ may be diminished, until ultimately it is but little adapted for the exercise of its full power. The knowledge of these facts has led one of the most gifted and ingenious naturalists of the present age—M. De Lamarck—to affirm, that the habits of an animal are not dependent upon its organization; but that, on the contrary, its habits, mode of life, and those of its ancestors have, in the succession of ages, determined the form of its body, the number and condition of its organs, and the functions and the faculties it enjoys,—a position, which he has supported with much plausibility, and, at the same time, with much that approximates to the *reductio ad absurdum*;—for example, when he takes the case of reptiles, which, as well as other vertebrated animals, in his view, had originally, according to the great plan of organization, four paws attached to the trunk. Serpents must consequently have had four; but having assumed the habit of creeping along the ground, and of concealing themselves in the grass, their bodies, owing to perpetual efforts at elongation, to enable them to pass into narrow spaces, acquired an unusual length in no wise proportionate to their thickness. Paws would have been quite useless. Long paws would have interfered with their creeping, and very short paws would have been but ill adapted for moving the body. Hence, the want of employment of these parts being constant, they gradually disappeared; although, says M. De Lamarck, they may have originally entered into the plan of organization of animals of their class.

But although this distinguished naturalist carries the influence of function on organization to an extent that cannot be maintained; it is certain, that the habitual exercise of an organ does add to its development within certain limits; whilst inaction gives occasion to its impoverishment. We have this signally exemplified, if we restrict an animal to diet of a different character from that to which it had been accustomed,—or to one foreign to its nature. In birds of prey, the digastric muscle—which is strong in the gallinaceous bird—has the bellies composing it so weak, that, according to Sir Everard Home, nothing but an accurate examination can determine its existence. But if a bird of this kind be compelled from want of animal food to live upon grain, the bellies of the muscle become so large, that they would not be recognized as belonging to the stomach of a bird of prey. Mr. Hunter kept a seagull for a year upon grain; after which he found the strength of the muscle greatly augmented. This wondrous adaptation of structure to the kind of food, which the animal is capable of obtaining, is likewise shown in the South American, and the African ostrich. The former is the native of a more productive soil than the latter; and accordingly the gastric glands are less complex and numerous, and the triturating organ is less developed.

It is owing to the effect of long-protracted action upon the body, that old and inveterate habits cannot be suddenly broken in upon with impunity. Issues, and persistent discharges of all kinds must be gradually checked prior to total occlusion; otherwise, the irritation, and consequent afflux, may be directed to other and important organs, which may be, at the time, specially disposed to assume a morbid action.

In like manner, where a person has been in the habit of daily indulging in the unmeasured use of spirituous liquors, he cannot safely withdraw, at once, the accustomed excitant. The nervous system, habituated to stimulation, totters, if it be abandoned; and delirium tremens, with all its horrors, almost surely supervenes. In times of spreading sickness, such sudden and total change of inveterate habits adds, no doubt, greatly to the extent of the calamity. The drunkard becomes alarmed; abandons his stimulant; and, under the depression that follows, readily receives the morbific influence, and sinks a victim to incautious reformation.

The effect of medicines on the frame is much influenced by habit. As a general rule, continued use diminishes it. This is signally shown in the case of opium. Instances are related in which two drachms or one hundred and twenty grains of solid opium, or five fluid ounces of laudanum, have been taken in twenty-four hours; yet before the habit was induced, these persons could not have taken five grains of the drug without danger.

But although this habit of endurance or resistance may have been acquired in the case of opium, it does not follow that the organism, thus rendered obdurate to it, will resist large doses of other narcotics. It may, indeed, be affected with considerable facility, provided another narcotic be substituted. In like manner, if a person has been habituated to the use of aloes as a cathartic, it may altogether lose its effect; yet if we change the special irritant, or have recourse to another cathartic—castor oil, or sulphate of magnesia, for example

—catharsis may be produced by an ordinary dose. It does not, therefore, follow, that the sensibility of the mucous membrane of the intestinal canal becomes blunted in these cases. It merely loses its impressibility as regards one irritant; whilst it may be equally susceptible of irritation from any other of the class.

According to this general effect of habit, it would follow, that the second dose of a cathartic ought to be larger than the first, provided it be administered within such a period, that the influence of the first dose continues to be felt; and it is the usual practice with the physician to direct the after dose to be larger: but there are some cathartics, which appear to differ in their action upon the mucous surface so as to render it more impressible,—many of the salines, for example. This effect has long been ascribed to Cheltenham water. It would seem, too, that the constitution, so far from becoming reconciled to lead by habit, is rendered more and more sensible to its action. Emetics, also, frequently act more powerfully by repetition. Dr. Cullen affirms, that he knew a person so accustomed to excite vomiting on himself, that the one-twentieth part of a grain of the tartrate of antimony and potassa was sufficient to produce a convulsive action of the parts concerned in vomiting. This difference as to the effects of agents by repetition we observe in disease. In certain cases, after the system has been once morbidly impressed, it is ever afterwards unsusceptible of the same mischief; in others, it is less susceptible; whilst, in others again, it is rendered unusually impressible. The last effect is seen in the case of miasmata—those at least that give rise to intermittent fever. A person, who has once suffered under a pernicious, severe, or even ordinary intermittent, may need a less dose of the malaria to reproduce the disease than was required to occasion the first attack; and, in some, the nervous system becomes so impressible, that a chill is experienced whenever they enter upon a soil that is exhaling the miasm. Persons so extraordinarily impressible have, indeed, been employed to indicate the existence or non-existence of malarious exhalations in given localities. In the seventy-second number of the *Edinburgh Review*, a writer pronounced several districts surrounding St. James's Park, in London, to be malarious, on the faith of an "animated miasmometer"—an officer who had suffered from the malarious "Walcheren fever!"

It may be laid down then, as a general rule, that remedies lose their effect by habit; and this is often strikingly the case with tonics; but if another tonic be substituted for a day or two, and the former be afterwards resumed, it may produce all its previous effects. Although, however, this is the general rule, it admits of numerous exceptions.

Under the name *Tolerance* is understood the power of bearing, in particular conditions of the system, a large amount of remedial agents, which, under ordinary circumstances, produce great perturbation in the economy. This differs essentially from habit, which is formed gradually, whilst the tolerance, in the case of the tartrate of antimony and potassa and other remedies, termed by the Italian School of Rasori 'contro-stimulants,' and of bloodletting, is exhibited nearly, if not wholly, from the first. This is a subject, however, which is referred to elsewhere in this work.

5. *Climate.*—The capability of existing in all regions is one of the attributes of humanity. Man is, however, considerably modified in his physical and mental characteristics by climate and locality. The temperate zone appears to be best adapted for his full development; and it is there, that the greatest ornaments of mankind have existed, and that science and art have flourished in plenitude. In torrid regions, the sensibility is over-excited; physical and moral energy is lost, and the native of the temperate zone, who has entered them full of life and buoyancy, has quitted them, after a few years' residence, listless, and shorn of his proudest characteristics. The frigid zone, on the other hand, is equally unfavorable to mental, and corporeal development,—the sensibility being blunted by the rigor of the climate. The effect of locality is signally exemplified in the *crétin* and *goîtreux* of the Valais, and of situations at the base of lofty mountains in almost every part of the globe; as well as in the inhabitants of our low countries, who are constantly exposed to malarious exhalations, and bear the sallow imprint on their countenances. All the circumstances connected with the causation of endemic disease exhibit the powerful morbid influence of climate and locality; and the outward conformation of the natives of different countries is an equal exemplification of their physiological influence. It is owing to such climatic modification, that we are enabled to distinguish the Frenchman from the Spaniard, Italian, and Portuguese, although belonging originally to the same great Romanic stem; as well as to discriminate the different branches of the Teutonic race —the German, Dutch, and Scandinavian—from each other.

As regards the disposition to disease of special organs induced by climate, it may be laid down as a general truth, that hot climates dispose to bilious complications. Heat occasions erethism of the whole dermoid system;—hence diarrhœa, dysentery, cholera morbus, &c., dependent upon irritation or inflammation of the lining membrane of the intestines; and such irritation, may be propagated by continuous sympathy along the biliary ducts to the liver, and in this way disease of that viscus may become induced by the influence of heat. The mode adopted at Strasburg and Metz, for enlarging the liver of the goose, is elucidative of this subject. (See the author's *Human Health*, p. 27, Philad. 1844.)

On the other hand, in cold climates, there is a greater tendency to inflammation of the mucous membrane of the air passages;— the irregularity in the cutaneous and pulmonary transpirations gives occasion to local excitement in the bronchial mucous membrane, which is not always restricted to that expansion, but in favoring habits may extend to the substance of the lungs, so as to develope pulmonary consumption. Hence, the effects of change of climate—especially the removal from a temperate to a torrid region, or conversely—become an interesting topic of inquiry to the physician in a hygienical as well as therapeutical point of view. The author has elsewhere shown, that owing to the great nervous susceptibility induced by the heat of the warmer climes, such climes are unfit for those that are predisposed to mania, and to head affections in general; whilst they are, *cæteris paribus*, the best that could be selected for such as are predisposed to pulmonary consumption, although most fatal to the same class of patients when the consumption has become confirmed.

The circumstances, that modify the physiological and pathological condition of man, necessarily modify also the mode of fulfilling therapeutical indications which may be obvious. The well-instructed physician readily detects those differences, otherwise it would be necessary that every student should be educated in the country where he has to practise his profession. The practitioners, who are destined to exercise their calling in British India, receive their education in the mother country; and Philadelphia sends her alumni to practise in Maine, in Louisiana, and indeed in every part of the globe to which the interest of the nation, or the thirst of gain leads the hardy and venturous citizen. The principles of the science—as before remarked—are alike everywhere; and but slight observation is requisite to guide the properly instructed mind to the appreciation of climatic differences of every kind.

Climate has some influence, but not much, in modifying the action of remedies. Dr. Harrison found, that narcotics produced more effect in Naples than in England. He instances the extract of hyoscyamus, which, in doses of three grains, three times a day, at Naples, produced temporary amaurosis or nervous blindness, which disappeared and recurred on the alternate suspension and administration of the medicine. This was observed in two patients, who had often taken similar doses of the same remedy in England without any unpleasant result,—an effect which Dr. Harrison refers to the increased nervous susceptibility or impressibility induced by the warmer climate. It might be suggested, that a source of fallacy existed in the circumstance of the Italian extract being more powerful than the English; but, in answer to this, Dr. Harrison remarks, that the medicine, which he administered in Italy, was procured from London. The same gentleman found, moreover, as a general rule, that the doses of medicines ordered in England were too large for the climate of Italy. The rule, indeed, may be extended, and it may be laid down, that remedies act more powerfully, or produce the same effect in smaller doses in hot climates, owing to the greater nervous susceptibility of the residents of such climates. Still, to this there are numerous exceptions. In referring to the subject, Dr. Thomson remarks, that "it does not always follow, that the doses of medicine require to be reduced in warm climates; on the contrary, in India, a scruple of calomel and a grain of opium are frequently administered, and repeated at short intervals, after depletion, in dysentery;" and he adds,—what must amuse the residents of many of the malarious districts of this country, and especially of the valley of the Mississippi—that "but few physicians would venture to prescribe this active remedy, in such large doses in this climate,"—in other words, in temperate climates. The truth is, that the action of calomel is but imperfectly understood. The French speak with horror of the doses administered by the English; and in some parts of this country they are equally surprised at the small doses in which it is employed in England. The author well recollects the tone in which a distinguished French army physician spoke of the hardihood of the English physicians in prescribing three-grain doses of calomel; yet there are practitioners in this country, who give it in the dose of one hundred, or one hundred and fifty grains, and even more. These immense doses do not produce a purgative effect in a direct ratio with the dose. On the contrary, two or three grains may be actively cathartic, whilst twenty may not produce more, or as much, effect. After bleeding especially, absorption is active; the mercury speedily attains the circulation, and is given off by cutaneous exhalation, as is evidenced by the effect produced upon a gold watch worn by the patient. Such appears to be the effect of a very large dose, even when bloodletting has not been premised, whilst a small dose appears to irritate—without there being the stimulus of quantity to induce absorption—and has a cathartic agency. In this way, a large dose of calomel may defeat the object of the prescriber who wishes to produce catharsis; and, by undergoing absorption and coming in contact, through the blood, with the tissues, it may excite a new action in the whole nutritive and secretory system; and even if we admit, that when given in unusual quantity it is altogether harmless, the superfluous amount must be esteemed a waste of the article.

In all the cases in which such large doses of calomel are administered, the practitioner is led to persuade himself, that the climate requires them. But this argument is often fallacious, and may be employed to bolster up any plan that has received, without sufficient examination, the approbation of a part or of most of the profession. Not many years ago, in the fevers of the South and West, calomel was considered to be indispensable,—the "Samson article of the materia medica," as it was often floridly termed. Now, it is affirmed by many to be always unnecessary, and often injurious, whilst the sulphate of quinia is looked upon as the remedy *par excellence.* It has been a common opinion, too, that in our ordinary bilious fevers, copious bloodletting, and the most active and irritating cathartics, are imperiously demanded; and the practice founded upon this belief was at one time universal,—so much so, that no other was adopted extensively until of late years; but since a greater degree of attention has been paid to the condition of the mucous membranes in these affections, and a better philosophy has suggested, that whilst we are keeping the different external sensitive surfaces free from all irritation, we ought not to be perpetually irritating the intestinal dermoid prolongation, practitioners have been induced to abandon the constant use of irritating cathartics; to keep the digestive canal free by the use of mild cathartics, which remove the morbid secretions as they are formed; and, by the proper use of sedatives—of which bloodletting is almost the only one—and of refrigerants, to reduce the inflammatory excitement. By such a plan—and *experi-*

ence can be equally adduced in its support—the ordinary bilious fevers of our country will be found to yield more satisfactorily than under the mixed sedative and irritating treatment, which was formerly universal, and still prevails too extensively. It is obvious that where one system of medication is exclusively employed, it is impossible to draw any deductions from comparison; and we are not justified in affirming, that climate requires one system more than another, until an equal trial has been made of all.

The therapeutist has opportunities for witnessing the modifying influence of climate, when individuals pass from a torrid to a temperate or a frigid zone, and conversely. If the removal has been from a hot to a cold climate, the impressibility is diminished, and larger doses of medicines are necessary to produce the wonted effect; if from a cold to a hot, the impressibility is augmented; smaller doses are necessary; and, owing to the same cause, less powerful excitants produce fever, and stimulating drinks have to be carefully avoided. "With respect to inuring foreigners to a country," says a modern writer on Therapeutics—M. Bégin—"we are to preserve their organs against the impression of the climate whose influence has been studiously examined. Thus, the inhabitants of the south, when transplanted into cold and damp climates, should keep their bodies warmly clothed, to preserve themselves from bronchitis and pneumonia, to which they become much exposed; and they are to assume gradually the use of warm and somewhat stimulating drinks. A substantial diet, consisting of animal food, with the moderate use of spirituous liquors, are the precepts to be observed in passing from a warm to a colder climate. Complete sobriety, and the use of vegetable food, are, on the contrary, necessary for those who pass from a northern to a southern latitude. In marshy places, abounding in simple or pernicious intermittents;—in those climates that are devastated by plague, yellow fever, cholera morbus, or dysentery, it is necessary to shun the action of the deleterious miasmata, to approach only by degrees the *foyers* of infection, to avoid intemperance of all kinds, and every excess, which, by increasing their susceptibility and irritating the digestive organs, evidently dispose to endemic diseases."

These last recommendations are equally applicable where the change of residence has been from a warmer to a colder region, even where there may be no endemic disease.

It has been a matter of repeated observation, that the habit acquired during a sojourn of some duration in any climate remains for some time after a removal to one of an opposite character. Dr. W. F. Edwards, of Paris, has shown this as regards the *physiological* performance of certain functions, and it has been long noticed *pathologically* in the watering and other *sanitaria* of Great Britain,—the resorts of the healthy and the valetudinarian from British India. Whatever complaint may attack the stranger, it is apt to assume the intermittent type, which has been impressed on the organism by previous residence in a hot and markedly malarious region. In such cases, too, the predisposition to disease of those textures, in which erethism is produced by great atmospheric heat, is manifest. It is to individuals thus circumstanced, that M. Bégin recommends the tolerably free use of spirituous liquors—a measure, to say the least of it, doubtful; and, in the author's opinion, more likely to produce irregularity of action, than any regimen that could be advised,—as it is impossible to keep up the excitation uniformly; depression must therefore succeed to the stimulation, and the former in a degree proportionate to the extent of the latter. In such a condition, morbific agents must necessarily impress the economy more powerfully than if all had been regularity in place of disorder.

What has been said of climate, as respects temperature, applies also to *seasons*. During the summer, the tendency of diseased excitement is to the mucous membrane of the alimentary canal; during the winter, to that of the lungs. The summer season is extremely fatal to infants in our cities, owing to a disease—cholera infantum—which consists essentially in erethism of the lining membrane of the tube, and is apparently produced by the combined action of heat and deteriorated air. The former alone appears to be insufficient to account for its prevalence, as it is rare in country situations where an equal elevation of temperature may prevail; and one of the most certain modes of prevention is to remove the infant from the town to the country.

6. *Mental Affections.*—There are numerous opportunities for observing the powerful effects induced by the affective faculties on the different functions when in a state of health. All these are caused by sympathetic association with the brain; the organ secondarily affected being in a state of excitation or depression according to the precise character of the emotion. Of the therapeutical influence of the emotions, the author will have to treat hereafter,—some of them being important agents in the removal of different forms of disease. The effects of one of the intellectual faculties, when inordinately exerted, on the bodily functions, are signal; and to these must be ascribed cures, that are said to have been effected by modes of management—often of the most revolting character—from time to time in vogue. In nervous, delicate, and imaginative persons, pains can be felt anywhere; sometimes, too, disease is developed in this manner; and, at others, feelings are experienced as distressing as if they resulted from actual disease.

It is through the imagination and its influence on the body, that we must explain the effects of credulity and superstition, so long employed as therapeutical agents. At one period in the history of medical science, the materia medica consisted almost wholly of the machinery of magic. Some, indeed, as Pliny, affirm, that magic was wholly derived from medicine; but, without inquiring into their precise order of precedence, it is certain, that there was a close affinity between them. The word *Ananazipta*, scrawled on parchment was said to cool fever. *Abracadabra*, supposed by Selden to be the name of a Syrian idol, figured on an amulet, and worn round the neck, was supposed to possess the power of curing ague, and of preventing many diseases, especially when uttered in a certain form, and a certain number of times. An hexameter from the "Iliad" allayed the agony of gout, and rheumatism yielded to a verse of the "Lamentations." In all these cases, the effects upon the physical ailment may have been produced through the action of the mind on the body, of which we have so many marked examples, and to some of which reference will be made presently; but, in other cases, the incantation was used where such agency could scarcely be presumed. Cato, the Censor, for example, pretended to be able to reduce luxations, after the manner of the Etruscans and Pythagoreans, by barbarous expressions, and by magical songs;—such as "*motas vaeta daries dardaries astatutaries*," or "*huat haut huat ista pista sista, domiabo damnaustra et luxato.*" Homer, too, affirms, that the bleeding of the wounded Ulysses was stopped by a charm, and the notion has passed down to the present enlightened age, and prevails in certain parts of Great Britain. It is referred to by Sir Walter Scott in the "Lay of the Last Minstrel," and is noticed frequently in the popular poetry of the last century but one. In all these cases, however, it is probable that the enchanter employed more direct appliances to the injured part, as in the "cure by sympathy," to which reference has already been made, and that he had not, therefore, implicit confidence in his charms. The only remnant of the notion of charms yet retained in medical language is the word "carminative," applied to a class of medicinal substances, employed in cases, which were usually cured, or attempted to be cured, by *carmina* or incantations in verse, or to such as operated like *carmina* or verse charms.

It need scarcely be said, that whatever curative influence was exerted by the ceremonies in the temples of old must have been through the *moral* on the *physique;* by the new impressions made on the nervous system, and on the imagination through the senses, thus indirectly modifying the whole system of nutrition. Even in those distant periods, however, we have seen, that judicious advice, in regard to diet and regimen, was given, which could not fail to produce salutary results. Such, too, was the case with the sympathetic powders employed in the treatment of wounds; and it was equally so with the Royal Touch, so extensively invoked at one time for the cure of scrofula or King's evil, by the sovereigns of England and France, whose peculiar attribute it has been claimed to be; but history does not sanction this—as might, indeed, be expected—for it appears to have been not unfrequently employed in Scandinavia, and to have been derived from the mystical practices of the Druids in curing disease. In France, the practice was continued, on the occasions of solemn ceremonials, up to the reign of Louis the Fifteenth; and it is stated by an historian of the period, that on Easter Sunday, in the year 1686, sixteen hundred persons were touched by Louis the Fourteenth,—the words used by the King being—"*Le Roy te touche, Dieu te guérisse,*"—"The King touches thee: may God cure thee." In the reign of Louis the Fifteenth, it fell into disuse; but was revived as recently as the time of Charles X, deposed in 1830, who touched at his coronation. In England, the origin of the touch is ascribed to Edward the Confessor, who ascended the throne in 1041. But the belief in its efficacy appears to have been greatest in the reign of Charles the Second. After the Restoration, the numbers that flocked to Whitehall and Windsor almost exceed belief. An exact register was kept of those who were admitted; and in twelve years—it appears—*ninety-two thousand one hundred and seven* persons were touched; and in one day—in June, 1660—*six hundred!* With the reign of Charles, the faith and confidence in the efficacy of the Royal Touch subsided. It is recorded, however, that, at the suggestion of Sir John Floyer, a distinguished physician of the day, then residing at Lichfield, the mother of Dr. Samuel Johnson carried him to London to be touched by Queen Anne, but without effect. On the same day, March 30th, 1714, two hundred persons were touched; and this would seem to have been the last occasion on which the touch was publicly practised in England; as upon the accession of the House of Brunswick the degrading mummery was discontinued.

And can we doubt for a moment, that the main agency, in these cases, was through the nervous system, in the manner already mentioned? After the Restoration of Charles II, the whole kingdom was in a state of high mental excitement; and for a time never was monarch more over estimated. All this would, of necessity, render his touch more effective; and accordingly, a larger proportion was considered to have been cured by him than by any other monarch. The idea, too, was maintained, that the gift could only be advantageously exercised by one who was a king by divine right; and we can, therefore, comprehend, during the existence of such a belief, that Cromwell may have failed, and that his royal successor might have been more fortunate. We are told, indeed, that Cromwell tried in vain to exercise this royal prerogative; "he"—says a loyal writer of the day—"having no more right to the healing power than he had to the royal jurisdiction;" and the key to the solution of the mystery is suggested by the remark, that after the Restoration none ever failed of receiving benefit, "unless their little faith and incredulity starved their merits."

That there was positive efficacy in this Royal Touch in scrofula there can be no doubt. Wiseman—one of the fathers of surgery in England, and whose name is inseparably associated with its history—declares, in his remarks on Scrofula, "that his Majesty"—meaning Charles the Second,—"cureth more in any one year than all the chirurgeons of London have done in an age;" and he affirms,—"I myself have been a frequent eye-witness of many hundreds of cures performed by his Majesty's touch alone, without any assistance of chirurgery, and those, many of them, such as had tired out the endeavors of able chirurgeons before they came hither." Yet no one at the present day would believe, for a moment, that any special virtue existed in the touch of royalty; for precisely the same results followed the touch and the invocations of Valentine Greatrakes in the 17th century, of whom the Royal Society of London expressed the incomprehensible opinion, that his success depended upon a "sanative contagion in his body."

It would be as impossible as unadvisable to instance the various shapes, which superstition, applied to medicine, has assumed; and the hold which it has taken on the minds of many, whose station in society and whose general attainments, it might have been presumed, would have steeled them against the intrusion of such beliefs. The science of medicine has suffered largely from the credulity and ignorance of those who profess it; and nothing can exhibit this more strikingly than the repulsive, and ridiculous agents, which have been had recourse to as a part of the materia medica; some of which were introduced or recommended by individuals, distinguished in their day for superior intelligence. Thus, Bacon believed in the virtue of charms, and amulets; and Boyle thought the thigh bone of an executed criminal a powerful remedy in dysentery. Celsus advised the warm blood of a recently slain gladiator, or a certain portion of human or horseflesh, for the cure of epilepsy; and remedies of this description are said to have been actually exhibited, with success, for the cure of epileptics, in the poor-house at Haerlem, by Abraham Kaauw Boerhaave, nephew of the celebrated Hermann, and professor of medicine at St. Petersburg, who lived so recently as the middle of the last century. Amongst the specifics of Alexander of Tralles were—the liver of a weasel freed from bile, taken for three successive days, fasting; the skull of an ass, and the ashes of clothes stained with the blood of gladiators. Pliny recommends stones, taken from the craws of young swallows, in epilepsy. Democritus mentions, that some diseases are best cured by anointing with the blood of strangers and malefactors, and others with the blood of our friends and kinsfolk. Miletus cured affections of the eyes with human bile. Artemon treated epilepsy with dead men's skulls; and Antheus, convulsions with human brains.

It may be said, that most of these degrading examples of credulous ignorance are taken from a far distant age, when physical science was yet in its infancy. It would be easy, however, to show, that, at a much later period, the same credulity reigned where it was least to be expected; and even now, the pharmacopœias of certain countries, eminent amongst nations for the advanced condition of mind in many of its aspects, exhibit evidences of the like degradation. Sir Theodore Turquet de Mayerne—who was physician to James the First, Charles the First, and Charles the Second, of England, and who was the most distinguished character of his day for learning, and as a practitioner—mentions, among his remedies, the balsam of bats for hypochondriasis; remedies taken from certain parts of adders; sucking whelps; earth-worms; mummy made of the lungs of a man who died a violent death; and many other articles equally gross, and irrational. Even a century after this period of defective observation and experience, no great advancement had taken place towards a knowledge of the effects of medicines on the animal economy. The doctrines of pathology were experiencing considerable mutation; anatomy and physiology were beginning to be vigorously cultivated; many improvements had taken place in the practice of medicine and surgery, and an immense number of new articles had been added to the materia medica, of which comparatively few, however, have been since retained; yet no great improvement had occurred in the discrimination of *false* from *true* facts, so far, at least, as regards the medicinal virtues of those articles which act insensibly on the frame, and which have been commonly denominated "alteratives."

The lists of the materia medica of this country and of Great Britain are free from those offsprings of superstition and credulity, although they may be objectionable for the multitude of articles admitted into them. Time, however, and improved observation and reflection will rectify this evil, until—fortunately for the student, practitioner, and patient—the list will embrace those agents only, whose virtues and applications are understood. Valuable time is frequently lost in the exhibition of a remedy of doubtful efficacy. "Anceps remedium quam nullum" is, indeed, a maxim of by no means universal application. The safety of the patient is often endangered by the credulity of the physician. In this way, the use of amulets, anodyne necklaces, camphor worn round the neck, &c., is objectionable. Presuming on their prophylactic or remedial powers, the wearer is apt to pass rashly into infected situations, when he would otherwise have been cautious, and, if attacked with disease, postpones the employment of efficacious remedies until the time has gone by for their successful administration.

Different bezoards or calculi found in the stomachs of animals, and at one time generally presumed to have the power of warding off contagious diseases, were to be found in the pharmacopœias of Amsterdam, Brunswick, Spain, and Wirtemberg. A distilled water of young swallows—officinally called *Aqua hirundinum cum castoreo*—existed in the pharmacopœia of Manheim as an anti-hysteric and anti-epileptic; the *oniscus* or woodlouse was in most of the European pharmacopœias, as a remedy in dropsy, and asthma; the powder of the dried frog, *Bufo exsiccatus*, in the Pharmacopœias of Spain and Wirtemberg, as an anti-hydropic; the powder of the human skull in the same pharmacopœias as an anti-epileptic; the dried liver of the mad dog, and that of the wolf, in the pharmacopœia of Wirtemberg, as an anti-hydrophobic; the Egyptian mummy in those of Spain and Wirtemberg, with the hoof of the stag, formerly regarded as a specific in epilepsy; besides many other articles equally absurd. Their retention is unfavorable to the scientific observation and induction of the people into whose pharmacopœias they are received; and it is somewhat surprising, that amidst the various pharmacopœias of German origin, that of Wirtemberg should have been so far behind in rejecting the relics of ancient ignorance. A useful lesson may, however, be deduced from all these facts. Many of the articles are calculated to produce considerable effect upon the imagination, and thus, they may really have been productive of advantage in the treatment of disease. Who, for example, could be told, that he was about to take a pill made of the powder of the human skull, or of an Egyptian mummy, without considerable emotion? Accordingly, it will be found, that most of these disgusting agents, as well as of the various nauseous remedies, yet retained in the pharmacopœias, —assafœtida, castor, skunk-cabbage, &c.,—are administered to the nervous, and the hysterical, as well as in the various affections that occur in paroxysms, to make a powerful impression on the nervous system, and thus break in upon the nervous erethism existing elsewhere. In this way, we account for the action of many anti-spasmodics, anti-epileptics, anti-hysterics, febrifuges administered for arresting intermittents, &c.; and for the efficacy of those methods of acting on the imagination,—animal magnetism, Perkinism, &c.,—that have excited the most extravagant enthusiasm, and then died away, leaving scarcely a vestige of their having been; but may be resuscitated under some other form, unless the experience of the past—by which, however, mankind are slow to profit—and the rapid diffusion of intellectual and moral light should be sufficient to choke them at their resurrection.

Perkinism, one of the most arrant delusions in the whole history of credulity, is the product of our own soil. Its proposer—Elisha Perkins of Connecticut—is represented to have been a man of strict honor and integrity; but manifestly of an ardent imagination, and unbounded credulity. Impressed with the idea, that metallic substances might exert some influence on the muscles, and nerves of animals, and be inservient to useful purposes, as external agents, in the treatment of disease, he professed to institute various experiments, until he ultimately fancied he had discovered a composition, which would serve his purpose, and of which he formed his "metallic tractors." These consisted of two instruments,—one having the appearance of steel, the other of brass. They were about three inches long, and pointed at one extremity; and the mode of their application was to draw the points over the affected parts in a downward direction for about twenty minutes each time. The effects seemed to be miraculous. The whole class of diseases on which the imagination is known to exert its efficacy,—and it will be seen afterwards, that it is most extensive,—rheumatism, local pains of various kinds, and in various parts, paroxysms of intermittents, &c., yielded as if by magic. The operation was termed *Perkinism* by the faculty of Copenhagen, in honor of the inventor; and institutions were formed in Great Britain, which were regarded for a time—that is, during the existence of the delusion—as sources for the dispensation of health to suffering thousands.

The following is from the report of the "Perkinistic Committee" of London on the establishment of their institution. "Mr. Perkins," (the son of the proposer) "has annually laid before the public a large collection of new cases, communicated to him for that purpose, by disinterested and intelligent characters from almost every quarter of Great Britain. In regard to the competency of these vouchers, it will be sufficient simply to state, that, amongst others, whose names have been attached to their communications, are eight professors in four different universities; twenty-one regular physicians, nineteen surgeons, thirty clergymen, twelve of whom are Doctors of Divinity, and numerous other characters of equal respectability. The cases published by these gentlemen in March last, the date of Mr. Perkins's last publication, amount to about *five thousand*. Supposing that not more than one cure in three hundred, which the tractors have performed, has been published—and the proportion is probably much greater—it will be seen that the number to March last will have exceeded *one million five hundred thousand.*"

With such apparently overwhelming testimony in its favor, can we be greatly surprised, that sufficient enthusiasm should have been excited amongst the credulous for the establishment of the Perkinistic Institution? A meeting was called for the purpose; the undertaking was unanimously resolved upon, and a subscription opened to carry the proposed charity into effect. The list was soon honored by above a hundred subscribers, several with a donation of ten guineas, and only one or two subscribing annually less than one guinea. Lord Rivers was elected President of the Society; and eleven other persons of distinction, among whom was Governor Franklin, son of the illustrious Franklin, composed the list of vice-presidents. On the 25th of July, 1803, a large house was opened in Frith Street, Soho Square, for the reception of patients, and in which the medical attendant, matron, and servants constantly resided. The objects of this establishment—as stated by the society in their publication on the subject—appeared to be philanthropic, and were as follows;—*First.* "To afford relief to the disorders of the afflicted and industrious poor of the metropolis, if the remedy should be found capable of that desirable purpose: and—*Secondly.* To submit the long-controverted question on the merits of the metallic tractors to the test of the severest scrutiny, the ordeal of experiment by disinterested persons, and thereby enable the public to form a correct opinion on the just pretensions of Perkinism;"—and it was farther proposed, in the report of the committee, that the British Parliament should investigate the merits of Perkinism, "and if convinced of its utility, honor it with similar patronage to other modern discoveries for the benefit of mankind." Yet, humiliating reflection! In a very brief space of time, the enthusiasm and the institution died away; and no one, at the present day, believes that the effect of Perkinism was anything more than an additional illustration of the success that must ever follow, for a time, the efforts of empiricism and pretension. Whilst the delusion was at its height, Dr. Haygarth determined to ascertain how far the effects might be ascribed to the imagination. He accordingly formed pieces of wood into the shape of tractors, and with much assumed pomp and ceremony applied them to a number of sick persons, who had been previously prepared to expect something extraordinary. He not only employed them in nervous diseases, but in all kinds of cases; and the effects were found to be astonishing. Obstinate pains of the limbs were suddenly cured. Joints that had been long immovable, were restored to motion; and, "in short," says Dr. Bostock, "except the renewal of lost parts, or the change of mechanical structure, nothing seemed beyond their power to accomplish."

Animal magnetism, as well as the employment of the magnet for the cure of disease, is, at the present day, exerting its therapeutical influence, partly through the same agencies. It is in such cases as those in which the tractors were found beneficial that they succeed.

The seventh son of a seventh son is presumed to possess miraculous healing powers; and Mr. Phillips states, that there is still, or was lately in Devonshire, a farmer who is a ninth son of a ninth son, and supposed, in consequence of his birthright, to be endowed with extraordinary powers of healing: he *strikes for the evil*, one day every week; "and an intelligent surgeon informs me,"—says Mr. Phillips—"that some of his cures in scrofulous cases, 'are really astonishing.' His fame is high in his district, and he takes care to preserve his credit by not undertaking the cure of all cases."

All these facts lead us back to the great influence exerted by the *moral* on the *physique*. Daily experience shows how satisfactorily a case of disease may proceed, if the faith of the patient be implicitly yielded to the physician, and to the mode of treatment he is pursuing; and how unhappily everything is apt to go on, when the contrary is the fact. The author has already cited a case, in which the same remedy had opposite effects, when prescribed by two different physicians—the confidence of the patient being reposed in the one, and not in the other. It is equally important, for the successful operation of a medicine, that the confidence of the patient should be felt in it, otherwise disappointment is apt to ensue; and, on the other hand, imagination or faith may render efficacious medicines inert, and may even —as before remarked—cause a medicine to have effects very different from those which it usually exerts.

A female patient was admitted into the County Asylum at Hanwell, under Sir William Ellis. She imagined she was laboring under a complaint which required the use of mercury; but Sir William discovering that the idea of the existence of the disease was an insane delusion, yet considering, that flattering the opinion of the lunatic to a certain degree might be favorable to her recovery, prescribed bread pills for her, and called them mercurial pills; after a few days, she was salivated, and the pills were discontinued. On again prescribing them after the salivation had subsided, she was a second time affected in the same manner; and this happened again on a third recurrence to the use of the pills.

The late Dr. James Gregory, of Edinburgh, was in the habit of relating an anecdote in his lectures, in illustration of the same subject. A student, who was laboring under fever, and was under the care of the doctor, required the administration of an anodyne; he was accordingly informed by the doctor, that he would order one for him, to be taken at bedtime. The patient, however, thought he said *cathartic*. The next morning, when Dr. Gregory called, he inquired what effect the *anodyne* had produced? "*Anodyne!*" replied the young man, "I understood it was a *purgative*, and a very active one it has proved. I have had four copious stools, and feel much relieved."

In Dr. Paris's Life of Sir Humphry Davy, there is a case equally instructive. Dr. Beddoes having inferred, that the inhalation of the nitrous oxide must be a specific for palsy, a patient was selected for trial, and placed under the care of young Davy. Previous to administering the gas, Davy inserted a small thermometer under the tongue of the patient to ascertain the temperature. The paralytic, deeply impressed by Dr. Beddoes with the certainty of the success of the remedy, of which he knew nothing, no sooner had the thermometer in his mouth than he declared he felt better. Nothing more was done, and the sick man was requested to return on the following day.

The same ceremony was repeated with the same result, and, at the end of a fortnight, he was dismissed cured,—no remedy of any kind, except the thermometer, having been used!

In an interesting account of the influence exerted on the public health of Hamburg, by the great fire there in 1842, Dr. Zimmermann states, that many bedridden invalids arose, and displayed supernatural force and energy; and that some of them remained permanently cured.

"But"—says Professor Simpson, of Edinburgh, in his work, alliteratively entitled "*Homœopathy, its tenets and tendencies, theoretical, theological, and therapeutical,*" "last year Dr. Horace Green, when visiting Edinburgh, informed me and others of an instance in which a homœopathic physician effected a more speedy and extraordinary cure than any of which Hohenlohe, Perkins, or any of that class could ever boast. A lady had been useless and bedridden for years; the spine was her own alleged seat of disease; and endless measures had been tried to restore her to health, and the power of standing and walking; but they had all been tried in vain. In consequence of the earnest advice and glowing representations of some female homœopathic friends, she had been long anxious to ascertain if homœopathic treatment could be of any use in her distressing case; but her husband refused to give his consent, believing homœopathy to be a 'discreditable delusion and a quackery.' Fortunately, however, for herself, her husband left her for a week or two, on a sporting expedition, and as soon as he set off with his gun and dogs, she seized hold of the opportunity, which she had long desired, of consulting a celebrated homœopathic physician. The physician listened long; examined into her case most attentively;—made before her written entries and memoranda, regarding all her symptoms and sufferings, and at last, on considering the whole, confidently assured her, that doubtlessly he could send her a drug, that corresponded with her disease, and which would produce such effects the first day, other effects the next, &c.,—and that, before her husband returned, she would be able to walk and enjoy life. The patient diligently swallowed the globules; all the predicted effects duly followed, and when her husband returned home, he was astonished and overjoyed to find his sick and bedridden wife up and well. The crime of consulting a homœopathist against his declared wish was readily forgiven, seeing the results of the homœopathic treatment had been so happy and beneficial; but he asked for a sight of the wonder-working 'globules,' that had produced so gladsome a change in his wife's health, and in his own prospects of domestic happiness. On being shown the globules, the acute and loving husband earnestly desired them to be most carefully preserved, and locked up, lest perchance his partner's distressing ailments should at any future time return. He then went and informed his usual family physician of this secret, that his wife had got well under a homœopathist, adding, that still he did not believe in homœopathy itself, for he found the globules, which she had swallowed, were not homœopathic drugs, but specimens of some small percussion pellets that were to be sent to him for examination (his gun being one formed for the use of the percussion pellet in preference to the percussion cap), but which had not arrived at his house till some time after he had left. The servant had mistaken the packet of pellets for the packet of homœopathic globules; and the lady had swallowed them under the belief that she was swallowing the homœopathic physician's medicine."

Two cases have fallen under the notice of the author of bedridden females, affected with symptoms of uterine disease, who have arisen, and walked about, under the influence of excited imagination occasioned by a firm faith in protracted ceremonies of a religious character, which, it was promised, should effect their restoration; and, annually, the author is in the habit of exhibiting to the clinical class of the Jefferson Medical College, the striking results of simple colored water in numerous forms of disease, which mainly require for their "cure" the undisturbed action of the natural powers.

"There is scarcely a malady,"—observes a recent writer, Dr. Carpenter,—"in which amendment has not been produced, not merely in the estimation of the patient, but in the more trustworthy opinion of medical observers, by practices, which can have had no other effect than to *direct the attention* of the sufferer to the part, and to keep alive his *confident expectation* of the cure. The charming away of warts by spells of the most vulgar kind, the imposition of royal hands for the cure of the evil, the pawings and strokings of Valentine Greatrakes, the manipulations practised with the metallic tractors, the invocations of Prince Hohenlohe, *et hoc genus omne*,—not omitting the globulistic administrations of the infinitesimal doctors, and the manipulations of the mesmerists of our own times,—have all worked to the same end, and have all been alike successful. It is unquestionable, that, in all such cases, the benefit derived is in direct proportion to the *faith* of the sufferer in the means employed, and thus we see, that a couple of bread pills will produce copious purgation, and a dose of red-poppy syrup will serve as a powerful narcotic, if the patient have entertained a sufficiently confident expectation of such results."

It will be easily understood, then, how important and extensive may be the influence exerted by the mind over the body in a therapeutical point of view, and that it is not unimportant to inquire into the likes and dislikes, the prepossessions and antipathies, of patients. It often happens, that in the course of a long disease a desire is felt for particular articles of diet, which may not seem, at first sight, extremely appropriate; but, in such cases, unless manifest evil would be likely to result, it is better to humor the individual, or at least not to resist him strongly; for it occasionally happens, that instinctive desire or appetites are experienced, which may not only be indulged in moderation with impunity, but with obvious benefit. The refrigerant regimen was at one time carefully avoided;—so long indeed as the doctrine of concoction of humors persisted; and one of the greatest improvements in the practice of physic, as applied to febrile diseases, is the free adoption of the cooling system, whenever the state of the body will admit of it. Instinct here led the way, and experience has proved the correctness of its monitions. The efforts of the practitioner, in a case of simple fever, are, indeed, mainly restricted to the employment of the refrigerant class of remedies. A prejudice is still found, however, against the use of iced water in fever where calomel is given. The feeling existed strongly in many parts of the Southern and Middle States; but it is rapidly yielding, and ought to be altogether abandoned. Cases may have occurred in which individuals have caught cold, or have had disagreeable symptoms supervening, when cold water has been taken after calomel; but they have been cases of the *post hoc*, rather than of the *propter hoc*. The author has been, for years, in the habit of allowing the use of iced water after calomel in fevers, and has never had the slightest evidence of any disagreeable results from it.

7. *Races, Professions, and Way of Life.*—These exert much influence not only on the susceptibility to disease, but on the indications of cure, and the mode in which these indications have to be fulfilled. This is exemplified in the influence of alcoholic potations, when used to excess for any length of time. By passing into the mass of blood, and penetrating every tissue, they modify the action of the system of nutrition everywhere; and the whole frame becomes liable to unhealthy inflammatory excitement, on the application of causes, which would have been incapable of producing such results before the system had been thus inordinately excited. The draymen, porters, coal-heavers and others of the British metropolis, who drink a gallon or more of strong porter during the day, and daily, although they may present the appearance of rude health, are liable to erysipelatous inflammation after the slightest external injury; and, when attacked by severe internal disease, do not bear the abstraction of blood like those of sound constitution and temperate habits.

But, independently of such habits, mode of life has a manifest effect upon the organism. The laborer, who is exposed to every vicissitude, is less susceptible of impressions, and consequently demands larger doses of medicines to produce the same effect, than he who is brought up in idleness and luxury. The effect of such habits is to render the frame extremely impressible, and hence the number of the nervous and the hysterical is infinitely greater amongst the upper classes of society. In this country, the difference of way of life cannot be exhibited to the same extent as in Oriental climes, where a distinct classification exists in society. Amidst the revolutions that occur in the fate of families, where the law of primogeniture does not hold, there is not much opportunity for tracing the effects of labor or of luxury through many generations; but in Hindostan, where a difference of castes has existed from time immemorial, and where the barriers are effectually closed against the entrance of the unprivileged, the effect is clearly shown. The artisans are above the tillers of the soil; and they exhibit in their conformation, as well as in their functions, the influence of a greater degree of refinement. The same remark applies to the Polynesians, where there is a like division. Ample opportunity, however, exists amongst us to notice the effects of the same agents on the Caucasian and Ethiopian races, and we are occasionally struck with the signal difference between the two; but in no case more than in the results of seclusion in our prisons, where the separate system is adopted, the health of the Ethiopian being much more injuriously affected.

It is in the investigation of morbid conditions that the knowledge of the profession or calling is a more important topic of inquiry than in Therapeutics. In order to appreciate accurately, in many cases, the cause and seat of a disease, the nature of the daily occupation must be known. The flax-dresser, the glass-cutter, the needle-pointer, &c., are liable to diseases of the chest, owing to the minute particles given off in their operations entering the lungs, and exciting irritation there, so as to produce many and fatal pulmonary maladies. Lead, again, gives rise to a series of symptoms, which have been called, collectively, "lead poisoning." When a person, consequently, presents himself to the pathologist, laboring under those symptoms, the inquiry suggests itself, whether he may not be engaged in one of those occupations in which lead is used,—as in smelting the metal, manufacturing sheet lead, or white lead, plumbing, glazing, painting, and composing in printing offices. By handling the metal, the carbonate of lead gets upon the fingers, and is swallowed, provided due cleanliness is not adopted. That this is the mode in which the poison of lead is often received into the system is shown by the fact, that in an extensive smelting establishment in Cornwall, at which cases of *colica pictonum* were extremely common, the disease was almost abolished after an order had been issued, and rigorously enforced, that no artisan should be permitted to partake of food until he had washed his hands carefully with the assistance of a nail-brush.

These inquiries are altogether etiological, and they afford us examples of the cessation of the effect after the removal of the cause. Reference has already been made to the fact, that although this may be the result in an immense multitude of cases, the diseased action often persists after the removal of the cause. In the large class of diseases, that are symptomatic, everything depends upon the accurate investigation and appreciation of the primary lesion; and this is often one of the most difficult points of pathological inquiry. "The greatest attention of the physician," says M. Bégin, "is frequently required to enable him to discover the real causes of the disease before him. A few months ago I was called to a woman affected with oppression of the chest, dry and frequent cough, and a painful sense of suffocation recurring at intervals; constant headache and vertigo; the conjunctiva injected; and the pulse full, hard, and not much accelerated. For two months, her menses had not appeared, in consequence of a violent mental affection. A copious bleeding, warranted by her vigor and youth, caused a subsidence of the cerebral symptoms; the menses reappeared; but the pectoral symptoms continued. For ten or fifteen days, I directed my treatment against what I considered to be irritation—either sanguineous or nervous—of the bronchia, but unsuccessfully. At last, during one of my visits, whilst conversing with her I observed her executing that remarkable movement which accompanies difficult and painful deglutition. On my inquiring, whether she suffered much in the same manner, she answered in the affirmative. I then proceeded to examine the throat: slight irritation existed about the pharynx and tonsils; but the uvula was elongated, filiform, and descended along the base of the tongue as far as the epiglottis. The true cause of the disease was disclosed. The exuberant appendage of the velum palati was immediately removed in the usual way; and all the symptoms disappeared."

This case is not novel, although M. Bégin seems to regard it so. It has been long admitted, that elongation of the uvula, by irritating the top of the larynx, may develope the ordinary symptoms of phthisis in such as are predisposed to the disease; and it can be understood, that if tubercles already exist in the lungs, it may excite them to suppuration. M. Bégin, however, uses the case cited as the foundation for a remark, "that circumstances of this kind are not unfrequent. The 'physiological doctrine,' in unfolding the origin and nature of a vast number of symptoms, heretofore considered as essential affections, has diminished the catalogue of diseases, and rendered their treatment more methodical and efficacious." The "physiological doctrine" of M. Broussais, of which M. Bégin is a zealous supporter, was not without its good fruits; but the case selected by him to prove this is not a happy one. It was not the doctrine that attracted his attention to the uvula, but the symptoms, and they would have equally done so, had no "physiological doctrine" ever existed. The "doctrine" has been as much injured by injudicious friends as by open enemies; and it is partly owing to want of discretion that it is now scarcely spoken of except as a matter of medical history.

8. *Causes, Seat, Period, &c., of the Disease.*—Enough has been said respecting the varied indications, and the mode of fulfilling them, according to the causes and seat of the malady. It need scarcely be remarked, that the period of the disease likewise exerts considerable influence, and is occasionally a source of difficulty to the therapeutist. In febrile diseases, the use of stimulants has been almost abandoned; but cases at times occur, when they seem to be indicated, and the practitioner is compelled to proceed with caution, and to decide with judgment, whether they be indicated or the contrary. Dr. Rush affirmed, that there was a period in fevers, when blisters might be had recourse to with advantage as stimulants, and to this period he gave the name "blistering point." If the excitement was above this point, blisters were improper; if below, the contrary. The difficulty would manifestly be to know it. It is not fixed with thermometric accuracy; and, consequently, the idea of the blistering point fell to the ground with its distinguished proposer. It will be seen, too, hereafter, that blisters are by no means unobjectionable agents in the cases referred to by Dr. Rush as requiring the administration of excitants.

In inflammatory affections, the period of the disease occasions modifications, which cannot escape the observant practitioner. Inflammation is apt to terminate in various ways, and it is important for the therapeutist to determine whether such termination—as it is technically called—has supervened; inasmuch as many of the ordinary signs of inflammation may be still kept up in consequence of the disordered action persisting, to a greater or less extent, in the affected tissues. Pneumonia, for example, may end in the effusion of a serous fluid into the lungs, or into the cavity of the pleura; and this fluid may keep up irritation there. The excited state of vessels, too, may continue in the seat of inflammation, though not to the same extent; and a very different system of medication may be advisable from that which was adopted before such effusion occurred; or at least the same activity of management may be altogether inadmissible. In like manner, in the inflammations of mucous membranes, which have persisted for a long time—or, in other words, have become chronic—excitant applications are made to take the place of the soothing, which were adopted in the earlier stages with advantage.

Under different states or conditions of the body, remedies are found to produce the most varied effects. During the existence of spasm in any portion of the system, opium may be given in immense quantities without inducing its wonted action. The author has sat by the bedside of a delicate female, laboring under the *cholelithus means*, of Dr. Good—that is, under gallstone in its progress along the biliary passages—to whom he has given tincture of opium by the teaspoonful, until she took upwards of an ounce; yet without any stupor following its administration. In like manner, in neuralgia, extreme doses of narcotics may be demanded, as well as in mania and melancholia, delirium tremens, tetanus, hydrophobia, &c.,—diseases in which the cerebro-spinal and reflex nerves are profoundly affected, and in which the great nervous centres can be impressed with extreme difficulty.

It is unnecessary to dwell upon this point. In every case of diseased manifestation, the mode of treatment has to be modified by the intensity, character, and period of the affection,—whether the morbid action be above the medium line or below it; or, in other words, whether excitants or sedatives appear to be indicated from the first.

To sum up.—It has been shown, that amongst the most important circumstances, which modify the indications of cure in disease, and the mode of fulfilling those indications, are,—age, sex, original conformation, habit, climate, mental affections, races, professions, and way of life, as well as the causes, period, and seat of the disease; and that all these have to be attended to, in order that the therapeutist may be enabled to administer his medical agents with judgment and efficacy.

CHAPTER III.

OF MEDICINES.

A medicine defined—General action of Medicines—Various modes of action—By simple, direct, or local action—By indirect or general action—Through the nerves—Through absorption—Changes experienced by medicines in the stomach, and elsewhere—Medicines divisible into Excitants and Sedatives—Classification of medicines—Barbier's—A. T. Thomson's—Pereira's—Author's.

A Medicine, in the enlarged sense, is any agent administered for the purpose of curing or allaying morbid action. The definition would include the different articles of diet and regimen, which are employed medicinally; and if we were to go into a nicety of definition, we might have to point out the difference between aliments, medicines, and poisons; but this is unnecessary. The term is well understood to be appropriated to agents, that are had recourse to therapeutically; or, in other words, to the various articles, which are received into the pharmacopœias or dispensatories, or which, in consequence of their action upon some tissue of the body, ought to be received into them. The Greek word φαρμακον signified both poison and medicine; and the generality of medicines are capable of exerting a deleterious agency if administered in too large a dose.

Every medicinal agent—to produce its effects—must impress some surface of the body, and it must perhaps be capable of impressing the surface, whether in a healthy or diseased state. To this, however, some plausible objections might be urged,—both directly, and from analogy. For example, it is well known, that the secretions do not act upon the parts with which they are destined to come in contact, when such parts are in a state of health; but if they become diseased, then the same secretions may excite violent irritation. This is exemplified in ardor urinæ,—a term which indicates a symptom, not a disease. When the lining membrane of the urethra is healthy, the urine passes over it without exciting any uneasy sensation; but when it is inflamed—as in blennorrhœa—the healthy fluid excites violent irritation, and such a sensation of heat as to cause the mischief to be ascribed to the urine;—hence the name *ardor urinæ*—and the French *chaudepisse.*

An acrid condition of the bile has often been adduced as the cause of diarrhœa. A better pathology teaches us, that the primary source of irritation is usually—universally, perhaps—in the lining membrane of the digestive tube, and that the liver is secondarily implicated;—a vitiated condition of the bile being very rarely, perhaps, the cause of bowel affections.

Again, we have an instance in which the same remedy has very different effects according to the varying condition of the organ. Most of the believers in the parturifacient powers of *ergota* or *ergot of rye* consider it devoid of action upon the unimpregnated uterus; many of them think it is capable of producing abortion; and all, that it adds to the efficiency of the parturient efforts, when once the process has become established. These, and other facts, might induce us to accord with Sir Gilbert Blane, and Dr. Paris, that medicines are frequently but relative agents, producing their effects in reference only to the state of the living frame: and there is truth in the remark of Sir Gilbert, that the virtues of medicines cannot be fairly essayed, nor beneficially ascertained, by trying their effects on sound subjects, because that particular morbid condition does not exist, which they may be exclusively calculated to remove; "thus, in certain states of debility, *tonics* may excite the system when languid, by their sympathetic influence upon the *primæ viæ;* while in a robust condition of the body, the effects of the same agents may be wholly inappreciable." As a general rule, however, we should be justified in doubting the potent medicinal efficacy of any agent, which produces no effect whatever on the healthy body.

I. MODUS OPERANDI OF MEDICINES.

The *modus operandi* of remedies is not always clear; yet, by careful analysis, we can generally appreciate it—in the main results at least,—although we may have much difficulty in comprehending the precise mode in which such results are accomplished. This applies especially to those cases in which the agency takes place by sympathetic influence,—an influence proverbially obscure, and frequently invoked with the view of covering the ignorance of the observer; as *vitality* and *organic action* are, at times, used by the physiologist, when a function cannot be explained by any known physical facts or arguments.

The modes in which the action of remedies is exerted are chiefly as follows.

a. BY SIMPLE, DIRECT, OR LOCAL ACTION.

When a medicine is taken into the stomach, it may affect that organ by simple contact; and no sensible impression may be made elsewhere. This is the simplest mode in which remedial agents act; and we have examples of the same kind in the application of caustics to parts, which we are desirous of eroding or destroying; in the use of astringents in hæmatemesis, and in cases of hemorrhoids when the remedy is applied so as to come into immediate contact with the affected parts; in the use of collutories for sore mouth; of external agents in ordinary local inflammation; and of a poultice in suppurative inflammation.

Inflammation, according to its degree, affords a good example of the mode in which disease may either be wholly local, or implicate the general system; and, likewise, of the way in which our remedial agents may affect the frame locally or generally. In a slight case of inflammation, we have the morbid action confined altogether to the capillaries implicated. The heart and larger arteries do not participate; and the efforts of the practitioner are principally directed to the use of agents, whose operation may be restricted to the inflamed part. But if the inflammation be more severe, the whole circulatory system sympathizes, and remedies may be required, which act both on that system generally, and on the vessels more immediately concerned. At times, however, we see the very best results from applications, which are directed simply to the inflamed part; and as the increased action becomes soothed in it, the sedative influence is propagated to the rest of the system, as the morbific influence was in the first instance. In cases of inflammation of the conjunctiva, a few drops of a weak solution of nitrate of silver, thrown on the eye, often allays the irritation almost instantaneously, and the increased action of the vessels communicating with the over-dilated capillaries speedily subsides; but if, on the other hand, a very strong solution of nitrate of silver, or of any other astringent, be dropped on the diseased eye, it may excite intense irritation there; and the vascular apparatus of the part, and even of the whole system, may be thrown into a state of turmoil. If we, then, soothe by appropriate applications, the turmoil ceases.

In these last cases, we have examples, not only of the purely local or direct action of medicines; but also of the extension of this action elsewhere,—constituting the next mode of operation.

b. BY INDIRECT OR GENERAL ACTION.

This is the mode commonly adopted in the administration of remedies. In most cases of internal exhibition, the agent must first come in contact with the stomach, and, through this organ—the great "centre of sympathies," as it has been long considered, and designated—other parts become impressed, according to the elective affinity of the particular article for some tissue or organ rather than for another. It is owing to the stomach being so intimately associated with other parts, that it is generally chosen as the organ, through which remedies are to act. If its functions are deranged, as in dyspepsia, the whole system sympathizes; there is not an organ that does not feel the depressing irradiations; the brain and nervous system may become so disordered that the patient is subject to all kinds of hallucinations; and hypochondriasis thus becomes a common concomitant of dyspepsia. Nauseating remedies exert their effect on the whole system, through the stomach, so as to be valuable agents in diseases of increased action, and, in short, as the different parts of the system can be affected by impressions conveyed through the stomach;—so, conversely, no irritation can persist for any great length of time in any organ without the stomach participating; hence it is, that it has been designated "the centre of sympathies."

The manner in which this indirect effect of medicines is induced is as follows:—

1. *Through the Nerves.*

Between every part of the system of nutrition there is the greatest sympathy or consent; so that if any one be inordinately and irregularly excited, others at a distance sympathize; and this to a greater or less degree, according as such parts are more or less disposed to take upon them, at the time, a similar derangement. This is seen when the feet are exposed to cold and moisture; derangement takes place in the nutritive functions of the feet, and this derangement is reflected to every part of the system of nutrition, so that in a dozen individuals exposed to this cause of disease, the derangements may be as various in their seats as are the individuals themselves, owing to the greater predisposition of some particular organ to assume a morbid action in one rather than in another. Now, that which applies to the external surface applies equally to the internal expansion of the skin forming the mucous membranes,so that medicines received into the stomach, by impressing the tissues of that organ, may produce sympathetic results on parts at a distance.

That medicines do exert their influence through the nerves—as one *modus operandi*—has seemed to be unquestionable. The researches of modern toxicologists appeared, indeed, to furnish us with cases that seemed unequivocal. If strong hydrocyanic acid be applied to the tongue of an animal, it dies so rapidly, that there may be scarcely time enough to remove it from the lap of the experimenter before life has ceased. In this case, it would seem to be almost impracticable for the poison to have entered the bloodvessels, and to have passed, with the current of the circulation, to the great vital organ on which its deleterious agency is exerted. The well-devised and carefully conducted experiments of Professor Blake, formerly of Saint Louis, have shown, however, that in the case of this poison, as of every other, the velocity of the circulatory current is so great as to enable us to comprehend, that the deadly influence may be exerted in all cases by the reception of the poison into the blood, and its subsequent contact with a vital organ. He found, that sufficient time always elapses between the application of the poison and the first evidences of its action to admit of such contact. In an experiment on a rabbit with hydrocyanic acid, the animal, immediately after the application of the acid to the lining membrane of the mouth, jumped from the table, and when on the floor of the room was perfectly able to stand on its feet. At two seconds and a half after the touch of the poison, it fell on its side; and was dead in five seconds. "This," he remarks, "is but one of many experiments which have been performed on cats and rabbits, and in no instance have I observed instantaneous death, or even the instantaneous action of the poison."

So far as Dr. Blake's experiments go, they are certainly favorable to the possibility of the action of all poisons by absorption; yet granting the velocity of the circulation to be such as described by him, and that a substance injected into the bloodvessels of an animal may be diffused through the circulatory system in nine seconds; it is difficult to conceive—as in the experiment mentioned above—that hydrocyanic acid should be absorbed and diffused so as to cause the animal to fall on its side in the short space of two seconds and a half after its application; or to admit with Dr. Pereira, in the third and last edition of his valuable work, that the experiments of Dr. Blake have given the *coup-de-grace* to the hypothesis of the action of medicines and poisons through the nervous system. Dr. Blake himself, indeed, goes no farther than to consider it "but reasonable to suppose that many, if not most" of our remedial agents modify the animal economy by entering into the blood, "and that therefore, in the scientific investigation of the action of medicines, a point of the greatest interest is, to endeavor to ascertain the effects produced on the blood by the substances that are thus mixed with it, and also the changes produced on the tissues of the body by their contact with the substances that are thus brought to them;"—and he subsequently adds—"but whilst at the same time, that I believe, that a great many of our medicines act when taken into the blood, and through changes produced in that fluid, yet I think the exclusive doctrine of the humoral action of medicines would be as ridiculous as that which supposes, that when a man sneezes after taking snuff, or has an attack of epilepsy from irritation in any other part of the mucous membrane, that the sneezing and the epilepsy are the result of changes produced in the blood."

Several of our medicinal agents act by preference on the nervous system, and of these all do not act upon it in the same way. Opium affects the brain, causing stupor; strychnia, the brain and spinal marrow, producing tetanic convulsions; and prussic acid excites coma with tetanus. The precise ground of these differences is inscrutable; yet that they exist cannot be denied. There is a manifest affinity between particular remedial agents and particular parts of the frame; and in whatever manner these agents are administered—whether by the stomach, or by the skin, or by infusion into the blood—they seek out the organs on which they act by preference; yet, why tartrate of antimony and potassa should produce vomiting, when injected into the venous system, and rhubarb purge—why such elective affinity should exist—is unknown to us.

We can likewise affect distant parts by applying our remedial agents to the cutaneous surface. Reference has been made to the effect on the system of the irregular action induced through exposure of the feet to cold and moisture. The effect of ablution, as a refrigerant in fever, is another example. If the skin be steadily hot and dry, cold or tepid water may be applied by washing or sponging, so as to diminish greatly the morbid heat; and, accordingly, it is one of the most valuable febrifuge remedies that we possess. The nutritive action of the tissues to which the cold or tepid fluid is indirectly applied is diminished, and, through that extensive sympathy, which has been mentioned as existing between every part of the system of nutrition, the sedative influence is speedily extended to the rest of the frame. It is to the external surface that most of our energetic counter-irritants or revellents are applied; although we shall find, that various local stimulants administered internally, are indebted, for much of their efficacy, to the derivation or revulsion they occasion.

Dr. Thomson regards the organ of smell as a third medium for receiving the impression of medicinal agents on the nervous system. The effect, he remarks, "is chiefly produced on the first and the fifth pairs of nerves distributed over the Schneiderian membrane lining the nostril, the adjoining sinuses, and the convoluted bones, so beautifully contrived to extend this surface in a limited space;" and he adds, that "many substances, which are supposed to enter the system by pulmonary absorption, such as the fumes of alcohol, tobacco, and ammonia, may affect the habit solely by impressions made on the nerves of smelling." In support of this opinion, he quotes numerous experiments by Dr. Rousseau, of Philadelphia, which appeared to warrant the conclusion, that by simply closing the nostrils, either by compressing them with the fingers, or by stopping them, the fumes of ardent spirits, or of a strong decoction of tobacco, or an infusion of opium might be inhaled for an hour, without any unpleasant effect; whereas if these precautions were omitted, the consequences were found to be most distressing. Notwithstanding, however, the mode in which these results are stated, the author cannot help doubting the accuracy of the experiments; and, of necessity, the deductions founded upon them. When substances are inhaled, either by the nose or the mouth, they come in contact with branches of the fifth pair of nerves. In the nose, it is true, they impinge also upon the ramifications of the first pair or the olfactories; but, on the other hand, in the throat, they meet with branches of the glossopharyngeal and pneumogastric. It is admitted, that more effect is produced on the nervous system, when they are passed through the nose, than when they traverse the mouth; but this is perhaps owing to the greater degree of velocity with which they are made to enter the former than the latter cavity, so that the nasal nerves are more powerfully impressed than the buccal, and—as the supporters of absorption would say—their entrance into the circulation through the mucous membrane is rendered more ready; but it is not necessary—as Dr. Thomson thinks is the general belief—that such absorption should be pulmonary. All the mucous membranes are absorbing surfaces, and although a portion of the fumes may pass, along with the inspired air, into the ultimate bronchial ramifications, and be there absorbed, imbibition takes place in every part of the mucous membrane, from the place where it commingles with the skin of the mouth to the point of termination of the minute air-tubes. Nor was the author aware, that any one entertained the opinion, that ammonia enters the system by pulmonary absorption. As well might it be presumed, that any inorganic and mechanical excitant, applied to the nasal nerves, exerts its agency in this manner.

Of the precise mode in which medicinal agents influence the nerves, we know little or nothing. It is not necessary, that the surface, with which they come in contact, should be physically modified, or any organic change be perceptible. In the case of the almost instantaneously fatal application of hydrocyanic acid, there is no time for the supervention of organic modifications in the part with which it comes in contact. The lethiferous influence is at once exerted, and if through the nerves, which—it has been seen—may be questioned, irradiations must proceed along them to one or other of the great vital centres, whose action ceases on the instant, and immediately afterwards that of every co-ordinate and tributary organ.

The mode in which the influence of medicines is extended to different organs, through the nerves, probably differs. In many cases, the impression, made upon the part to which the agent is applied, passes immediately to the brain, and is thence reflected to the sympathizing organ. This is probably the way in which medicinal agents generally produce their effects through sympathy; but in certain cases it would seem that this reflection is not indispensable. A demulcent, by passing over the top of the larynx, produces a soothing influence there, which may extend to other parts of the pulmonary mucous membrane, by, what is termed *sympathy of continuity*, effected through a continuous surface. In the same manner, the action of a suppository, or of a glyster, excites the upper parts of the intestinal tube to contraction. Physiology and pathology furnish multitudes of examples of this kind of sympathy, as well as of the *sympathy of contiguity*, of which we have an instance, where the muscular coat of the intestines is aroused to increased action by the irritation of a cathartic on the mucous coat; or, where we attempt to produce an emmenagogue effect by the administration of cathartics—such as the preparations of aloes—whose action is mainly exerted on the lower part of the bowels.

The generality of physiologists of the present day look to the nervous system as the great source and medium of communication of the different irradiations by which distant organs are supposed to react sympathetically upon each other. The rapidity, indeed, with which the various actions of the nervous system are executed,—the apparent synchronism between the reception of an impression on an organ of sense and its perception by the brain, as well as between the determinations of the will and their effect upon a muscle,—naturally attracted the attention of physiologists to this system as the instrument of sympathy; and we certainly know enough to infer, that, in many cases, in animals, the nerves appear to be the conductors; that the brain is, in others, the centre, to which the organ in action transmits its irradiations, and by which they are reflected to the sympathizing organ; whilst, in others, again, the effect is caused in the absence of a nervous centre, and perhaps even of nerves, in a manner, which, in the present state of our knowledge, is inexplicable. It is not difficult, however, to conceive, that by means of contractility, impressions—vibratory or other—may pass rapidly from one part of the organism to another, as they do in the vegetable, which—if we admit it to be possessed of a nervous system at all—has it in a primitive and rudimental form, and has certainly nothing like a nervous centre for the reflection of impressions. Vibrations, it is well known, communicated through the air from a sonorous body when struck, impress the organ of hearing: light probably acts in a similar manner upon the visual apparatus; and we may suppose, without any violence to probability, that a similar vibratility may exist over the organism, so that an impression made upon one part may rapidly oscillate to another, independently of anything like nervous communication.

It must be essentially in this way, that medicinal agents exert their efficacy by *revulsion* or *derivation*. It is a general rule in the animal economy, that two diseased actions do not readily go on at the same time with the like degree of intensity. This has been the subject of remark for ages, and for all ages; and many popular remedies have been suggested by a knowledge of the fact. When any morbid action is going on in the system, and a new source of irritation is artificially excited, it often happens, that the new irritation, by attracting the nervous and vascular afflux to it, detracts or derives from the internal morbid action, so as to diminish, or wholly remove it. It is in this way, that blisters, and the various counter-irritants, issues, setons, moxas, &c., produce their beneficial effects, not by the discharge which they occasion. Hence, too, it is, that benefit results from a popular remedy,—the application of a garlic poultice to the thumb in cases of toothache. But these are only marked examples of revulsion. It accompanies, likewise, the action of every local stimulant. It follows the use of cathartics, and is the way in which their chief remedial agency is, in many cases, exerted. In head affections, especially in apoplexy, a revulsion, thus effected, is often most salutary; and for this purpose, when deglutition is impracticable, and even when not, powerfully stimulating enemata are thrown into the rectum with advantage. In like manner, the milder cathartics may be productive of benefit in gastro-enteritic affections by the succession of sympathies, which they induce while passing over the different tracts of the intestinal canal. Diuretics, and in short, as already remarked, all local stimulants owe a part of their efficacy to revulsion; and some of the most valuable agents we possess in the treatment of protracted disease,—as mercury and iodine,—are often employed with no other view. The avowed object of the practitioner is to excite a new action; or in other words to produce, artificially, a new condition of the system of nutrition, which may remove that previously existing.

The doctrine of revulsion reposes on the received belief, that diseases are cured by remedies which are counter to them,—"*contraria contrariis medentur;*" but an imposing medical sect has attempted, and is attempting, to overthrow this doctrine, and to set up the opposite,—"*similia similibus medentur.*" The 'Homœopathists' maintain, that there are remedial agents, which can produce symptoms similar to those of disease, and that every dynamic affection of the living organism can be destroyed by another of still greater intensity, and permanence, that strongly resembles it. They maintain, indeed, that the curative virtues of medicines are *solely* dependent upon the resemblance their symptoms bear to those of the disease. There are but three modes, they affirm, of applying medicines in disease; *first*, the *homœopathic; secondly*, the *allopathic* or *heteropathic*,—the method in general use, which is said by them never to regard that which is really diseased in the body, but to attack parts that are sound, in order to draw off the malady from another quarter, and direct it towards the latter; and *thirdly*, the *antipathic*, *enantiopathic* or *palliative*,—by which, they affirm, physicians have, till the present time, succeeded in affording apparent relief, and gained the confidence of their patients by deluding them with a temporary suspension of their sufferings.

Upwards of a third of a century ago, Samuel Hahnemann—the founder of the "homœopathic medical doctrine;"—first propounded his opinions in the authoritative form of the "Organon der rationellen Heilkunde"—"*Organum of rational medical science.*" The book was issued from the Dresden press, but did not at first attract much the attention of physicians. In 1819, a second edition appeared under its present title,—the epithet rationellen or 'rational,' having been omitted. Since that time, it has passed through different editions, and the English reader, who is not a German scholar, is enabled to peruse it through the medium of a translation by Mr. Devrient, with notes by Dr. Stratten, of Dublin.

It is not the author's intention to inquire into the principles and claims of this fantastic doctrine at any length; but a few observations may be appropriate. Cinchona appears to have been the first drug experimented with by Hahnemann. Whilst occupied in translating the Materia Medica of Cullen into German, he was dissatisfied with the explanation of the febrifuge powers of the drug, and determined to make trials upon himself. He took it in considerable quantity while in perfect health, and found it produced symptoms like those of ague. Hence, he inferred, that intermittents are removed by cinchona, in consequence of its exciting in the system a morbid condition similar to that for the removal of which it is administered.

Again,—say the homœopathists,—mercurial preparations, when administered internally, produce symptoms—local and constitutional—so closely resembling those of syphilis, that medical practitioners, who have spent years in the investigation of that disease, find it difficult, and in some instances impossible, to distinguish one affection from the other. If the venereal poison produces pustules, scales, and tubercles, mercury does the same. If syphilis is attended with inflammation of the periosteum and caries of the bones; so is the action of mercury. "Inflammation of the iris from lues," says Dr. Stratten, "is an every-day occurrence; the same disease is a very frequent consequence of mercury. Ulceration of the throat is a common symptom of syphilis: the same affection results from mercury. Ulcers on the organs of reproduction are the result of both the poison and the remedy; and furnish another proof of the doctrine *similia similibus.* Nitric acid is generally recommended in cutaneous diseases; the internal use of this remedy, in a very dilute form, produces scaly eruptions over the surface of the body; and the external application of a solution, in the proportion of one part acid to one hundred and twenty-eight parts water, will produce inflammation and ulceration of the skin. These observations would lead to the conclusion, that nitric acid cures cutaneous diseases, by the facility it possesses of producing a similar disease of the skin. Nitrate of potash, administered internally, in small doses, produces a frequent desire to pass water, accompanied with pain and heat. When this state of the urinary system exists as a consequence of disease, or the application of a blister, a very dilute solution of the same remedy has been found beneficial. The ordinary effects of hyoscyamus niger are vertigo, delirium, stupefaction, and somnolency. Where one or other of these diseased states exists, it yields to small doses of the tincture of this plant. The internal use of hyoscyamus is followed by mental aberration, the leading features of which are jealousy and irascibility. When these hallucinations exist this remedy is indicated. Opium, in general, causes drowsiness, torpor, and deep sleep; and yet this remedy, in small doses, removes these symptoms when they occur in disease. Sulphur is a specific against itch; notwithstanding which, when it is administered to healthy individuals, it frequently excites a pustular eruption resembling itch in every particular."

Dr. Stratten asserts, that these deductions are drawn from actual experiment; and so, we are told, are all the positions advanced by the homœopathists.

The doses of medicines administered by them are infinitesimally small; the decillionth degree of dilution is not uncommon. The following extract from Hahnemann's treatise on chronic diseases will show to what an extent the farce is carried.

"Of homœopathic medicines, take one grain of those which are solid (mercury being included in the number), or one drop of those which are liquid; put this small quantity on about the third part of a hundred grains of pulverized sugar of milk, in a porcelain capsule that is not glazed; then mix the medicine and the sugar of milk together for a moment with a spatula of bone or horn, and pound the whole strongly during six minutes. The mass is then detached from the bottom of the capsule and pestle during four minutes, in order that it may be perfectly homogeneous, and then rubbed down afresh during six minutes with equal force. Collect the whole of the powder into a body during four minutes, then add the second *third portion* of the sugar of milk, and mix the whole for an instant with a spatula; then triturate with force during six minutes. This is to be once more scraped together during four minutes, and rubbed again for six minutes. Stir the whole together during four minutes, and add the *last third* portion of the sugar of milk, which is to be mixed by turning it about with the spatula; then triturate the mass powerfully during six minutes, scrape it together during four minutes, and the whole is finally to be rubbed down for six minutes. After the powder has been carefully detached from the capsule and pestle, put it into a phial, and let it be corked and labelled with the name of the substance, and the mark $\overline{100}$, which shows that the substance is in the hundredth degree of attenuation. To carry the medicine to the ten thousandth degree of attenuation, take one grain of the powder marked $\overline{100}$, prepared as above, add the same to the third part of an hundred grains of pulverized sugar of milk, mix the whole in the capsule, and proceed in such manner, that after having triturated each third portion with force during six minutes, scrape the mass together during a space of four minutes. The powder, when thus prepared, is put into a well-corked bottle with the figures $\overline{10,000}$ marked on the exterior, which will point out its degree of attenuation. The same method is observed when this second powder marked $\overline{10,000}$ is to be carried to the millionth degree of attenuation," &c. &c.

The homœopathic method can only be regarded as a branch of the *expectant* stem; and it is liable to every objection that applies to the latter. The homœopathists argue, however, that inasmuch as very small portions of a chemical substance can be detected in a solution, so may minute portions be capable of impressing the organism. For example—say they—one grain of nitrate of silver, dissolved in one thousand five hundred and sixty grains of distilled water, will yield an evident gray precipitate, perceptible in every part of the fluid, when two grains of chlorohydric acid are added to it;—and again; when one grain of iodine is dissolved in a drachm of alcohol, and mixed in the same quantity of distilled water as in the last case, and to this two grains of starch, dissolved in an ounce of water, are added, an evident blue tint is produced in the solution. In these experiments, consequently, the grain of the nitrate of silver and iodine must have been divided into one-fifteen thousand two hundred and sixtieth of a grain.

These experiments, however, are in nowise elucidative of the position;—for although such minute portions of chemical agents may be detected by the senses, it by no means follows, that they can exert a remedial action. Accordingly, it is affirmed by M. Andral and others, that when the homœopathic system has been impartially tried, it has not been found to succeed in the manner asserted by its supporters. Like the expectant method in general, it is totally inefficient in acute cases; but like it, where advantage is to be derived from trusting to that recuperative power, which, we have seen, is seated in all living bodies, and is too much neglected, its adoption is beneficial. This is one of the useful lessons, which the system aids in teaching. Another, perhaps, is,—the propriety, now universally admitted, of simplicity in our perscriptions, in consequence of the greater or less uncertainty that must often exist—where two or more agents are thrown together—whether they may not mutually modify each other's action. The homœopathists believe, that every disease carries with it a greater susceptibility for the proper medicine; and, accordingly, they lay down the rule, that only one simple medicine should be administered to the sick at a time.

One of the strangest of the assertions of Hahnemann and his followers is—that homœopathic medicines acquire at each division or dilution a new degree of power, by the rubbing or shaking to which they are subjected, "a means," says Hahnemann, "of developing the inherent virtues of homœopathic medicines that was unknown till my time; and which is so energetic, that latterly I have been forced, by experience, to reduce the number of shakes to two, of which I formerly prescribed ten to each dilution"! ![1]

Yet homœopathy, with all its absurdities, enables us to deduce rational and important inferences. Which of us could credit that if we take a grain of flint or charcoal, mix it with as much sugar as could be contained in the hold of a line-of-battle ship, and give a grain of this, that it could exhibit any 'potency;' and *à fortiori* that smelling at this infinitesimal quantity of a powerless agent could possess any curative property? Yet the homœopathist professes to believe this; and the dose is even large for him. But if we reflect that diet is carefully attended to; and that an air of mystery is thrown around the new light, whilst the instinctive actions are not interfered with by powerfully disturbing influences, we can as readily understand, that a large mass of chronic diseases may yield to it—especially when occurring in those of nervous and excitable temperaments, and whose faith and confidence are freely given to novel agencies, particularly when shrouded in mystery—as that the same class of affections should have yielded to the ceremonies in the ancient temples. The investigation of this subject has indeed led a distinguished, bold, and independent searcher after truth, and an elevated member of the profession, Sir John Forbes, to deductions strikingly analogous to those which the author had for many years promulgated. Animadverting, in forcible language, on the absurdity of the doctrine which teaches, that the decillionth of a grain of charcoal or oystershell is capable of producing hundreds of the most formidable symptoms, and of curing, as by magic, the most inveterate diseases, whilst we can take ounces, nay pounds, of the very same substance into our stomachs with no other inconvenience than its mechanical bulk,—and stating, that this "seems so gratuitous an outrage to human reason, that the mind instinctively recoils from the proposition,"—he philosophically inquires into the alleged cures by the homœopathists, and arrives at the just conclusion, "that the curative powers of nature suffice to explain all the triumphs of homœopathy; when we take into consideration other agencies which are at the same time brought to bear;—as the much stricter regulation of the diet and regimen, including the entire omission of vinous and other stimulants; the influence of the imagination, stimulated by previous belief in the potency of the remedies prescribed, and nourished by fervent faith, hope, &c., and by the indirect influence of this faith, hope, &c., in inducing patience, so that time is allowed for nature to work the cure in her own way." Homœopathy has certainly tended to impress upon us still more strongly the well-known, but too often overlooked, truth, that all diseases do not require the employment of energetic disturbing agents; and that many of them will proceed more satisfactorily towards health under judicious hygienic cares, without the assistance of any medicine. Rational therapeutics has, therefore, benefited by homœopathy, notwithstanding the follies of the doctrine; whilst it may be admitted, that in special cases evil has resulted from the exclusion of greater energy of treatment.

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[1] Hahnemann's words are:—"Dass ich in den letztern Jahren, durch überzeugende Erfahrung genöthigt ward die ehemals vorgeschriebenen *zehn* Schüttelschläge nach jeder Verdünnung bis auf *zwei* einzuschränken."—*Organon der Heilkunst*, § 280.

Taking into consideration, the innumerable forms of catarrh, diarrhœa, fevers, and inflammations, which get well without any medical aid, it may be inferred, with Albers, that by far the larger proportion of maladies are recovered from without the assistance of the physician. Three-fourths of diseases, Albers thinks, are thus removed; and even where the advice and prescription of the physician are invoked, it is—as he well remarks—exceedingly difficult to determine, in special cases, how much of this result has been owing to the efforts of art.

2. *Through Absorption.*

The proofs, that medicines may be absorbed from the alimentary canal and elsewhere, in their entire state, are as numerous as they are satisfactory. It is but necessary, that a substance should possess the requisite tenuity to soak through the coats of the veins, and thus get into the circulatory current. The facts and arguments, connected with the absorbent function of the veins, are so fully detailed in the author's '*Human Physiology*,' that a simple reference to them here may be all that is necessary. Few physiologists of the present day doubt, that those vessels are capable of this function; yet it was denied by one therapeutical writer, Dr. Chapman, of Philadelphia, that medicines can pass unchanged into the venous system, or, in other words, that they can be absorbed in their entire state: the assertion and belief are designated by him as a "relic of the humoral pathology;" and he affirms, "that it must at least be acknowledged, that no substance in its active state does reach the circulation, since it is shown, that a small portion, even of the mildest fluid—as milk, or mucilage, oil, or pus—cannot be injected into the bloodvessels, without occasioning the most fatal consequences."

Setting aside the multitude of facts, which show, that substances may be absorbed by the veins, and be detected by chemical reagents in the blood, we know well, that they can be injected directly into the vessels without producing death; and that, since the time of Harvey until the present, the "infusion"—as it has been termed—of medicinal agents into the blood has been a common practice. It is asserted to have been first employed about the middle of the seventeenth century, and it has been practised at the veterinary school of Copenhagen, with complete success,—the action of the remedy being more speedy, and the dose required much less, when thus administered. Experiments of this kind have confirmed the well-known but singular fact—already referred to—that medicinal substances exert their action by preference upon certain parts of the body, in the same manner as if they had been received into the stomach. Tartrate of antimony and potassa vomits, and castor oil purges, not only as certainly, but with much greater speed; for, whilst the former requires to be in the stomach for fifteen or twenty minutes before vomiting is excited, it produces its effects in two or three minutes when thrown into the veins. Of late years, the custom has been, in certain diseases and in numerous experiments, to load the bloodvessels with warm water so as to induce a state of preternatural fulness; and, in cholera, the quantity of saline solution injected has been enormous. The great, the necessary, precaution appears to be, that the fluid should not be too viscid; for it has been found, that thick fluids, such as oil, or mixtures of powders, are unable to pass through the pulmonary capillaries, in consequence of which the circulation is arrested, and death follows: and within these limits the remark of Professor Chapman is correct. Such was the result of several experiments on animals with powdered substances, undertaken by an enthusiastic physician of Boston—Dr. E. Hale, Jr.,—who had nearly fallen a victim to an experiment of the kind instituted on himself. Dr. Hale, desirous of observing the effects of castor oil when thus injected, attempted to pass it into a vein of the arm; he experienced, however, considerable difficulty in introducing it, and to this his safety has been ascribed. Soon after the injection he felt an oily taste in the mouth, which continued for a length of time, and the medicine produced great gastric and intestinal disturbance.

Again;—much depends upon the mode in which the injection is sent in,—as regards velocity. If a drachm of healthy bile be suddenly thrown into the femoral vein in a state of concentration, death soon follows; but if it be suffered to pass in very slowly, little or no inconvenience results. It was the opinion of Bichat, that if a bubble of air should accidentally enter the venous system, it would cause death; but the experiments of MM. Nysten and Magendie have shown, that if it be introduced slowly, no unfortunate event need be apprehended. It is a cause of death after severe surgical operations, although it is not much more than a quarter of a century since the *ratio moriendi*, in such cases, was first suspected. Some animals admit enormous quantities of air into the veins without perishing. M. Magendie instances the case of a horse into whose veins he sent, as rapidly and forcibly as he was able, forty or fifty pints of air without occasioning immediate death, although the animal ultimately expired; and M. Lepelletier de la Sarthe alludes to similar experiments of his own; from which he infers, that the fatal action of the air is mechanical, and that it is possible to prevent the result by injecting so gradually, that the blood has the power to disseminate, and perhaps even to dissolve the gas, with sufficient promptitude to prevent its accumulation in the cardiac cavities. No doubt, then, ought to exist, that medicines can be absorbed from the stomach or elsewhere in their entire state, and that when once in the circulation they may affect the great nervous centres, or proceed with the current to act on those organs for which they have a special affinity.

It would seem, moreover, that many remedial agents may act in a purely physical manner, by influencing the phenomena of endosmose. When the serum of the blood is separated from another liquid by means of an organic membrane, two currents are established through the membrane—the one from the serum to the liquid; the other from the liquid to the serum. As a general rule, very concentrated solutions of salts were found by M. Poiseuille to cause greater endosmose of the serum, whilst dilute solutions gave rise to endosmose of the solution; and for solutions of a certain intermediate strength, the two currents were equal. On the other hand there are substances, as muriate of morphia, whose presence arrests endosmose, by physically rendering the membrane impermeable to either liquid.

The application of these facts to the action of medicines is full of interest. M. Poiseuille found, that there was endosmose through animal tissues from the serum of the blood to Seidlitz water, and to solutions of sulphate of soda and common salt; and this is known to occur when these substances are used as medicines;—the evacuations always containing a considerable quantity of albumen. In such case, endosmose takes place from the serum of the blood in the capillaries of the intestines to the saline solution in the alimentary canal, but, as will be seen hereafter, the action of saline cathartics cannot admit of entire explanation in this manner.

Another remarkable phenomenon, observed by M. Poiseuille and confirmed by M. Bacchetti, is the influence exerted by muriate of morphia on an organic membrane. When this salt is added to a saline solution, it greatly weakens endosmose from the serum to the solution, and ultimately reverses the direction of the current. To this endosmotic influence, MM. Poiseuille and Matteucci are disposed to ascribe the efficacy of morphia and opium in checking diarrhœa and the cathartic effects of other substances, as well as in causing constipation; and it, doubtless, ought not to be wholly overlooked in accounting for the phenomena.

The phenomena of endosmose enable us to explain the fact, that certain poisons, as the venom of the viper, and the curare, can be introduced into the stomach with impunity; and that this is not owing to any change produced in them by the gastric secretions, is shown by the circumstance, that if the curare was previously subjected to them for twenty-four or forty-eight hours, it was as virulent as ever; whilst the gastric juice, to which it had been added, retained its full digestive powers. The experiments of MM. Bernard and Pelouze have demonstrated, that the absence of poisonous phenomena, when the poison is received into the stomach, is owing to the gastro-enteric mucous membrane refusing the penetration of the poison, although it is soluble; and they adduce the following experiment to prove this. If the gastric mucous membrane of a recently killed animal be adapted to an endosmometer, so that the free surface faces outwardly, and the endosmometer containing sugared water be placed in a watery solution of curare, endosmose, at the expiration of three or four hours, will be found to have taken place; yet, the liquid in the tube will exhibit no trace of curare, as may be demonstrated by inoculating with it. If the experiment were allowed to go on for a much longer period, endosmose of the poison might occur; but the mucous membrane would then be found to have experienced modification, the mucus and epithelium being altered; and if, instead of taking a fresh mucous membrane, one be chosen that has experienced change, endosmose of the poisonous fluid will take place almost instantaneously.

Messrs. Bernard and Pelouze extended their examination to other mucous membranes, as to those of the bladder, nasal fossæ, and eyes; and with the same results. An injection was kept in the bladder of a dog for six or eight hours without inconvenience; the urine passed by the animal exhibiting all the poisonous properties of the curare. One mucous membrane only they found excepted from this immunity—the pulmonary. When the curare was applied to it the same results supervened as when it was placed in the subcutaneous areolar tissue. See the author's *Human Physiology*, 8th edit. p. 156, Philadelphia, 1856.

Substances may be absorbed from the cutaneous surface, although this is infinitely less easy than from its prolongation, which constitutes the mucous membranes. The cuticle is a great obstacle to absorption; for if it be removed in any manner, so that a substance, capable of absorption, can come in contact with the vessels of the corpus papillare, absorption takes place readily. The same thing happens—to a more limited extent—if we force the substance by friction through the cuticle. This is the mode in which we affect the system by means of mercurial unguents. We select a part of the body where the cuticle is thinnest, and continue the friction until the globules of mercury disappear, or until it has been forced through the cuticle into contact with the corpus papillare. The most undoubted evidence exists, that mercury enters the blood. Dr. Colson detected it by introducing plates of polished brass into the blood, which became covered with a coating of mercury; and Dr. Christison affirms, that it has been obtained from the crassamentum of persons salivated, when no mercury could be detected in the serum. Many such cases have been recorded. In one in which the oxide and the chloride of mercury, had been given for the cure of inveterate syphilis—*lues inveterata*—and which terminated fatally, Professor Albers, of Bonn, found globules of the metal in the lungs and in the diploe. Moreover, by means of the microscope, Dr. Oesterlen detected minute globules of mercury in the tissues, in the blood, and in the secretions of men and animals to whom mercurial ointment had been given internally, and applied by frictions to the skin. It is maintained, indeed, by M. Melsens,—and the view is embraced by Dr. William Budd, Physician to the Bristol Royal Infirmary,—that in cases of mercurial and saturnine poisoning, the metallic substance is in actual union with the affected part or parts, and is retained there in the form of some insoluble compound; and the efficacy of iodide of potassium in such cases is presumed to be exerted by its forming with the metallic poison a new and soluble salt, which is set afloat in the circulation, and in this manner eliminated by the kidneys. The view is plausible; but not the less hypothetical.

It has been strongly recommended, by Dr. Christison, that diuretics should be employed in dropsical cases by being rubbed upon the abdomen.

The method of administration by friction is called the *iatraleiptic:* the one which consists in placing remedies in contact with an abraded or vesicated surface, the *endermic*. The latter method has been chiefly employed in recent times; and it has been advised where it was conceived that digestion would interfere with the action of the drug,—a succedaneum, which, according to the peculiar views of Dr. Chapman, would be wholly inoperative, inasmuch as he considers every section of the absorbent system to be endowed with the power of digestion and assimilation, and the lymphatics quite as conspicuously as the lacteals: this he regards as a provision of nature to exclude noxious matters from the circulation,—an opinion which is a necessary pendant to his views regarding the mode in which substances enter the vessels.

Medicines may likewise be received into the system, in their entire state, by the lungs. The whole of the respiratory apparatus is lined by a mucous membrane resembling that of the digestive passages, and as the substances, which enter into the air-tubes, are extremely tenuous, they can pass with facility into the bloodvessels. The different respirable gases produce their effects in this way; and hence the hilarity caused by the protoxide of nitrogen or "laughing gas;" the anæsthesia from the inhalation of ether and chloroform; and the exciting or depressing influences produced by inhaling appropriate gases.

Reference has already been made to the opinion of Drs. Rousseau and Thomson, that ardent spirits exert their intoxicating influence by impressing the nasal nerves; but it is more probable that much of the intoxicating effect produced on those who pump ardent spirits from large casks into small vessels, in extensive wholesale establishments, is owing to the vapor of the alcohol entering the lungs with the inspired air, and being imbibed by the pulmonary vessels. It is doubtless in this way, that miasmata—both terrestrial and animal—exert their influence;—their first impression being made either on the nerves distributed to the coats of the pulmonary bloodvessels, or on the nervous centres, when carried thither with the circulatory fluid. The rapidity with which the effects are exhibited, when a person, who—owing to previous attacks of malarious disease, has been rendered unusually susceptible to the action of miasmata—is subjected to their influence, is surprising.

Thus far attention has been directed to the absorption of medicinal substances in their entire state. It often happens, however, that they are decomposed prior to, or after entering the circulation. Indeed, the greater number of remedial agents undergo change during their passage through the economy, and their therapeutical agency is probably exerted as new compounds. It is admitted, that sulphur, phosphorus, and the alkaline sulphurets, become oxidized in the system, and are discharged in the urine as sulphates and phosphates. One writer on Therapeutics, already cited—Dr. Chapman—has supposed, that in all those cases in which salts appear to have entered the blood in their entire state, they are decomposed in the stomach; that their components enter the circulation under the influence of the vital energies, which prevent them from recombining; but that, as soon as they reach the secretory or excretory organs, they are thrown, as it were, beyond the sphere of those energies; and their chemical affinities being brought into play, they recombine, and the substance is again perceptible, or can be detected, by tests in the excretions. A satisfactory reply to this hypothesis is, that such substances have actually been detected, in their entire state, in the blood; and besides, no great safety to the economy could accrue from their decomposition, in many cases, as the elements would be more injurious than the compound. The objections, indeed, to the view are signal. When substances can pass so readily into the vessels by imbibition, there is no necessity for invoking this operose process. There are, however, many medicinal agents, which require to be set free in the stomach before they can act on that organ. When certain vegetable substances are administered, especially in decoction or infusion, the parts that are susceptible of the action,—the mucilage, extractive, &c.,—are digested, whilst the medicinal component exerts its appropriate agency. Dr. Thomson thinks it is to this circumstance that we may ascribe the time, which elapses between the swallowing of certain medicines, and the period when their operation becomes apparent. "Thus," he says, "if half a drachm of powder of the root of ipecacuanha be swallowed, from fifteen to thirty minutes generally elapse before vomiting is produced, a circumstance which we may fairly attribute to the envelopment of the emetina—the active constituent of the ipecacuanha—in the wax, gum, starch, and ligneous matter of the root; it cannot exert its influence until extricated from these by the process of digestion." But this is not a happy illustration of his position, inasmuch as the same length of time is required for the emetic operation, when ipecacuanha is given in forms that are devoid of those organic accompaniments, as in the *vinum ipecacuanhæ* of the pharmacopœias, or in the various preparations of its active ingredient—emetia. Tartar emetic, too, is as long in inducing emesis, although it is well adapted for rapid absorption, or for instantaneous action on the nerves of the stomach. It will be seen hereafter, that a more satisfactory mode exists of accounting for the delay in the operation of both these useful drugs, when exhibited for the purpose of acting as emetics.

It is an interesting matter of inquiry as to the changes of a chemical nature, which must be experienced by many medicinal agents when received into the stomach. Although the precise chemical character of the gastric secretions may not be considered definitely settled, observation would appear to have shown that, in man, there is present free chlorohydric acid, with chlorides, and phosphates, and albuminous matters to no inconsiderable amount, especially after a meal of animal food has been taken. It is conceived by Dr. Pereira, that whenever acids are administered as medicines, they unite with bases, and enter the bloodvessels in such combination; and, consequently, that there can be no analogy between the chemical influence of free acids added to blood after it has been withdrawn from the body, and that of acids combined with bases, which enter the blood from the alimentary canal. Where acids, however, are administered freely, it is difficult to imagine that they can meet with bases in sufficient abundance to neutralize them; and so in regard to alkalies, alkaline earths, and bases of various kinds. If they are received into the stomach soon after eating, and when there is a plentiful supply of the gastric acids, they may be neutralized, provided they are not in large amount; but in other cases, the excess of alkali probably reaches the blood; and, as will be shown elsewhere, may give occasion, in the system of nutrition, to such a metamorphosis of organic matters as to increase the quantity of solids contained in the secretion of the kidneys. (See Diuretics.)

Almost all writers on pharmacology affirm, that the acetate of potassa is decomposed in the stomach,—the acid being digested, whilst the alkali passes into the circulation, combines with other acids, especially the carbonic, and is excreted by the kidneys. From the experiments of Wöhler, Millon, Laveran, and others, it would seem, indeed, to be a general rule, that the salts of potassa and soda formed by an organic acid are transformed into carbonates. In the dyspeptic, affected with unusual predominance of acid, any alkaline carbonate taken into the stomach excites effervescence in the same manner as when added to the chlorohydric or acetic acid out of the body. Nitrate of silver is a substance which can rarely or never enter the circulation unchanged. It is possessed of caustic properties, and is often used to destroy fungous granulations in wounds and ulcers. When applied in such cases, the nitrate is decomposed by the animal matter with which it is made to come in contact; and the oxide of silver, by exposure to the air, becomes black. If the salt, too, be taken internally, for any length of time, it is apt to produce a leaden hue of the surface. "Now it is evident," says Dr. Thomson, "that this effect could not take place if the nitrate of silver were not taken into the circulation in an undecomposed state: for, if the nitrate were decomposed in the stomach, and converted into muriate of silver, this is an insoluble salt, and consequently not fitted to be taken up by the absorbents. But if we admit, that the nitrate of silver is taken into the circulation in its undecomposed state, we can readily explain the manner of its decomposition by the capillary vessels of the skin, and its deposition in the rete mucosum in the state of an insoluble muriate, which would necessarily render any tinge, communicated by it to the skin, permanent."

It is difficult to see how the nitrate can escape decomposition from the chlorohydric acid always existing in the healthy stomach, as well as from the chloride of sodium, which is present in the humors. It is probable, indeed, that, in the small quantity in which it is administered internally, it never enters the circulation in the state of nitrate, but always in that of chloride; which,—as Dr. Thomson properly remarks,—is insoluble; but this would not seem to be an insuperable obstacle to its absorption. The insoluble chloride of silver, rendered soluble perhaps—as will be seen hereafter—by the alkaline chlorides in the gastric secretions, enters the bloodvessels, passes to the surface, is deposited in the corpus papillare, and—under the influence of light—is converted from a white to a dark violet color,—an effect which can be easily demonstrated by exposing chloride of silver to light, out of the body. Moreover, in experiments by Professor Oesterlen, in which powdered charcoal and other insoluble substances were administered to animals for five or six days in succession, minute particles of those substances were distinctly detected in the blood of the mesenteric veins. Similar results were obtained by Eberhard, and by Mensonides, and Donders, not only with charcoal, but also with sulphur and starch; the latter of which, was detected in the blood by iodine. It is difficult to assign a plausible explanation of the mode in which these substances pass through the coats of the vessels; but the facts, if admitted, militate against the proposition of M. Mialhe, that every remedy must be soluble, or susceptible of becoming so, in the fluids of the living body, before it can be absorbed. To his general propositions on this matter, there can, however, be no objection. If a medicine is soluble, and not decomposed by the fluids of the alimentary canal, it is absorbed at once; but if insoluble, it requires the intervention of the acids, alkalies, or saline compounds contained in the digestive fluids, in order to enable it to enter the vessels. In this mode, metals, the greater number of metallic oxides, and certain salts, are dissolved by the gastric acids; the metalloids, the insoluble acids, certain insoluble salts, oils, resins, balsams, &c., are rendered soluble by the alkaline matters in the intestinal fluid; whilst other insoluble salts, as calomel, sulphate of lead, chloride of silver, are acted on and dissolved by the alkaline chlorides, which are present throughout the whole alimentary tract.

Still, as regards the precise changes experienced by remedial agents when they first come in contact with the living solids and the blood, we have much to learn. Notwithstanding, indeed, the labors of recent medical therapeutical inquirers, there is truth in the remark of Dr. Pereira, that, "for the greater number of medicines accurate observations are still wanting: and we form our opinions of the nature of the changes principally by analogy, aided, in particular cases, by some isolated fact."

Corrosive chloride of mercury sometimes undergoes a conversion of great interest to the toxicologist. It may happen, that a person has been poisoned by it, and yet there may be no evidence of the presence of anything in the intestinal canal, except the mild chloride or calomel. In such case, how are we to know, whether the mild chloride be the result of the decomposition of the corrosive chloride, or whether the person may not have taken the mild chloride a short time prior to dissolution. When the corrosive chloride meets with albuminous matters, it is decomposed by them, and is converted into mild chloride; and if the decomposition has been produced by the animal matter of the coats of the intestines, it will be found intimately united with them; whilst if the mild chloride has been taken prior to dissolution, it may be observed lying upon the mucous surface, and in no way amalgamated with it.

If we force mercury through the skin, we can affect the salivary glands, and whilst the system is pervaded by it, a gold watch exhibits, by a white coating, that the mercury is exhaled by the cutaneous surface. In like manner, if blue pill, or calomel, be administered in adequate quantity internally, the watch will be equally coated by the mercury. We do not know the exact condition of the exhaled metal in these cases; whether, in the case of the mercurial ointment and blue pill, it be still oxide,—in the state of calomel, still mild chloride;—or whether, in all these instances, it be not decomposed, and given off in the form of mercurial vapor. The fact, that metallic mercury has been detected in the bodies of such as have died under its influence, leads us to presume, that the metal may be reduced, and exhaled in the form of vapor, so as to occasion the coating in question.

Examination of the urine demonstrates what salts pass into the mass of blood without experiencing change: and what others are always decomposed before or after entering the bloodvessels. MM. Trousseau and Reveil classify, as follows, the substances, which in the existing state of science are known to be eliminated by the urine. First. *Substances, which pass into the urine without any or scarcely any change.* Carbonate and nitrate of potassa and of soda; sulphocyanuret, cyanuret and ferro-cyanuret of potassium (detected in 60 minutes); borate of soda; chlorides of barium, calcium, &c.—*Coloring matters.* Indigo, madder (in from twelve to fifteen minutes); rhubarb (in twenty minutes); gamboge (in twenty-five minutes); black cherries (in forty-five minutes); elderberries (in seventy-five minutes); volatile oils, of turpentine (violet odor), of valerian, saffron, garlic, castor, and asparagus. Secondly. *Substances which pass into the urine in a state of combination.* Sulphur, phosphorus, iodine (in five minutes); the sulphuric, sulphhydric, iodhydric, gallic, and benzoic acids, &c. Thirdly. *Substances that are decomposed.* The alkaline salts of vegetable acids, which are transformed into carbonates.

When substances enter the blood by absorption, if they can chemically combine with any of the principles of that fluid, they probably do so; but this is not accomplished so readily as might be presumed, owing to the presence of organic matter, which interferes largely with the ordinary affinities. Out of the body, we have full opportunity for witnessing the changes induced by the gases, and by various agents on the blood prior to coagulation. They are striking; and it has been, too hastily perhaps, inferred that similar changes must be produced when the same agents are applied, in the same state of concentration, to the blood whilst circulating in the vessels; and that if the pabulum of the different nutritive processes be modified, the functions of secretion and nutrition must be importantly modified also.

It is difficult, however, to arrive at any satisfactory inference in regard to the action of medicines from their chemical qualities; for whilst it often happens, that analogous substances—as the mineral acids—act alike, the contrary is observed in the cases of morphia and quinia. On the other hand, substances, that are very unlike—as castor oil and sulphur—have analogous action, when taken internally. In a series of experiments instituted by Dr. Blake, late of St. Louis, he was led to infer, that, when introduced into the blood, the salts of the same base appear to exert the same effect on the animal economy; and farther researches led him to the fancied discovery of a "law," that all isomorphous substances, when introduced into the blood, produce analogous effects, and give rise to the same reactions in the economy; in other words, that the reactions, which take place between the elements of the living body and inorganic compounds, are not governed by the ordinary chemical properties of those substances, but depend on certain properties they possess connected with their isomorphous relations.

One of the phenomena observed by him was the connection between the physiological action of substances and their isomorphous relations to the elements of the blood. He found, that those substances, which exist in the blood or have isomorphous relations with its elements, have the least marked reactions. "The salts of palladium, platinum, and baryta are those which prove fatal in the smallest doses; and it is a curious fact, that under an isomorphous point of view, these three substances are those which have the least analogy with the elements that enter into the formation of the animal solids and fluids. On the other hand, arsenic, which might have been supposed to be rapidly fatal, is so inert, when introduced into the blood, that it will not speedily produce death, unless, indeed, it is injected in quantities sufficient to directly coagulate the blood;"—and he adds—that "it remains for future experiments to determine if this is owing to its being isomorphous with one of the elements of the fluids and solids, the phosphorous."

The results arrived at by Dr. Blake are of much interest; and the line of direction he has pursued in his inquiries is certainly well worthy the attention of the physiologist. It may be stated, however, that from certain experiments made by Mr. Nunneley, on anæsthetic agents, he draws the conclusion, "that substances which are isomeric, or nearly so, but very dissimilar in physical and chemical properties, are also so in physiological; as witness several of the pure hydrocarbons, which, though very similar in composition, are very different in properties."

The difference in the rapidity with which the absorption of medicinal agents is accomplished is great. It is dependent upon the degree of distension of the vessels, and on the existence or absence of erethism in the part. If polyæmia or vascular fulness exists, absorption is tardily effected; but if bloodletting be premised, the substance speedily passes through the coats of the bloodvessels, and enters the circulation. In some experiments by M. Magendie, in which water was injected into the vessels, so as to produce a state of artificial plethora, and the fluid was thrown into a serous cavity, it was found, that whilst the state of plethora existed none of the fluid entered the circulation; but when blood was drawn from a vein, the fluid in the serous cavity rapidly disappeared under the eye of the observer, by soaking through the coats of the vessels, and entering the circulatory current. Hence it is, that in those active effusions or transudations into serous cavities, which constitute dropsies, bloodletting may be a philosophical and energetic remedy.

If the vessels of the lining membrane of the intestinal canal be in a state of hyperæmia, the digestive and other absorptions are no longer accomplished. This is probably the case in malignant cholera, in which the watery portions of the blood are exhaled, until that fluid is, in many cases, left so thick, as to be unable to pass along the vessels, and this, notwithstanding nutritive fluids may have been constantly and freely taken. It is on this account, also, that there is frequently so much difficulty in affecting gastro-enteritic patients with mercury. In the last stages of many of the bilious and typhoid forms of fever, the absorbent function of the intestines is almost annihilated, in consequence of the hyperæmic condition of the mucous membrane of the digestive tube. The non-absorption of calomel in these cases, M. Mialhe ascribes to the intestinal fluid containing less of the alkaline chlorides, and, therefore, to less corrosive sublimate being formed; but the difficulty applies to even the most soluble articles; and is, doubtless, in part, if not mainly, owing to the fulness of the small vessels forming an obstacle to endosmotic action.

Whenever a medicinal substance is received into the blood, it can scarcely fail to modify the condition of the fluid. Certain poisons, as sulphuretted hydrogen, appear to so far destroy its character, as to prevent the ordinary changes that supervene when it is removed from a vessel. In the language of some pathologists, they produce *necræmia* or death of the blood,—it being assumed by them, that the blood, like the living solids, is possessed of life. Somatic death is, however, produced, in all probability, by the specific affinity between the poison and one or other of the great vital centres; for, experiments appear to show, that whilst certain deleterious agents have especial affinity for, and action upon, the heart, the great centre of all circulatory movement; others act, by preference, on the great dispensers of nervous influence, and, through the noxious impression made on the vesicular centre of the medulla oblongata, put a stop to respiration. Experiments on blood removed from the living vessels demonstrate the manifest effects of substances, like the neutral salts, on the coagulation of that fluid, and it would seem fair to infer, that some change must be produced in it whilst circulating in the vessels; yet we should not be justified in inferring, that the same changes occur in the two cases. We know, indeed, that large quantities of saline substances may be injected into the vessels without any great disturbance of function. Unfortunately, almost all the observations that have been made necessarily apply to blood out of the vessel, which is no longer in the same condition as when in it. That the blood is, however, capable of being modified by substances received into it, is sufficiently shown by the action of Eutrophics—a class of medicinal agents, which—as will be seen hereafter—produce their effect by being absorbed into the bloodvessels, proceeding to the tissues, and modifying the action of the cells engaged in nutrition, the chemical agents administered being subsequently detected in the secretion of one of the great depuratory organs,—the kidney.

We have much, however, to learn, in regard to the mode in which medicinal agents are affected whilst in the organism. From the results of the observations of M. Cl. Bernard, it is evident, as he remarks, that this cannot be reduced to any general law. He found, in numerous experiments, that certain soluble substances, circulating in the economy without giving rise to any unpleasant symptom, produce two orders of remarkable phenomena. *First.* Some substances never pass into certain secretions; yellow prussiate of potassa, and cane and grape sugars, for example; whilst others appear in all the secretions, but with different degrees of rapidity,—iodide of potassium, for example. *Secondly.* Certain of these substances are eliminated completely and rapidly, by the urine,—the yellow prussiate, and sugars, for example; whilst others are eliminated, in part only, by the urine, and may remain in the organism, and exhibit themselves for a longer or shorter period in other secretions. Iodide of potassium is a remarkable instance of the prolonged sojourn of soluble substances in the organism, which—M. Bernard suggests—is doubtless increased by the eliminated portion, found in the saliva, instead of being thrown out of the body, passing into the stomach, whence it is taken into the circulation; again separated in the saliva; and the same succession of actions being ofttimes repeated.

The result of all his observations leads M. Bernard to conclude, *first*, that experiments made with one saline substance can teach nothing in regard to another, seeing that nothing *à priori* could lead to the inference, that iodide of potassium, and yellow prussiate of potassa,—salts equally soluble, as regards their passage into the secretions, and their elimination—would present differences so marked; and *secondly*, that special researches are necessary for each substance to establish its physiological history; which must be intimately associated with its mode of therapeutical action.

Such are the chief modes in which medicinal agents exert their influence on the human economy.

I. Their action may be altogether direct or local.
II. It may be general—through local influence.
  1. By means of the nerves.
  2. By absorption.

II. CLASSIFICATION OF MEDICINES.

The unbounded credulity, which at one time prevailed regarding the effects of drugs, and which so long disfigured the science of medicine, has greatly diminished, and we observe less and less of the old feeling of confidence in the adaptation of particular drugs to particular cases of disease. The practice has become more rational; and well-tried agents are now mainly relied on. Still, many superfluities exist in the lists of the materia medica, which might, with much propriety, be dispensed with; and time will accomplish this. The plan now is,—to discover the seat and nature of the diseased action, and to adopt a remedy, whose properties are known to the exigency,—*locally*, or *generally*, as the case may require. We have no agents, that are possessed of specific properties, which are exerted with unvarying uniformity on disease. Their action is modified by numerous circumstances. A cathartic may, in one case, excite emesis in place of catharsis; and, in another, an emetic may excite catharsis rather than emesis; whilst the words *febrifuge*, *antispasmodic*, &c., are mere terms to express the secondary result of some agent on the vital solid. It is in consequence of medicines possessing no *specific*—no uniform—influence, that so much skill and attention are required in the treatment of disease. At one time it was supposed, that certain drugs are specifically adapted to combat certain morbid conditions, but the belief, except with the homœopathists, is now exploded, and even mercury—the panacea of some—is denied to possess any such power, and its action is more rationally accounted for.

From what has been said, it will appear that, although we may be perfectly acquainted with the ordinary medicinal properties of a drug, and although these properties may be essentially the same, the agency, exerted by it, may be different according to the precise character of the disease, and according to the age, sex, temperament, &c., of the patient. Were these points determinate, we could always calculate with certainty what would be the precise action of any medicinal agent.

With regard to the parts of the frame on which medicines act, we may affirm, that they are capable of affecting every tissue and every function—directly or indirectly. Like other influences which surround the body, and are perpetually impressing it in some mode or other, remedial agents can act upon the living organs so as to modify every function. Ultimately, however, they must all affect the same great vital property of *contractility*, *irritability*, *incitability*, or *excitability*, whichsoever we may term it, which is seated in every living tissue. Under the influence of this vital property, kept in action by appropriate stimuli, all the functions are accomplished, and, when these stimuli are in a certain degree, are accomplished in health; but if, from any cause, the vital force becomes exalted or depressed below the healthy standard, disease results; and such disease may be one of increased or of diminished action. Medicinal agents, which, in this way, exalt the vital activity of the body, are *excitants*;—such as diminish it are *sedatives*; and we may, consequently, with propriety, class all agents, that are useful, or that are not wholly inert, either as *excitants*, or as *sedatives*.

The subject of the classificationof medicinal agents will, however, require a little farther consideration. The advantages of classification in science are obvious. The relations of articles to each other are, in this way, exhibited so as to impress the memory, and to facilitate the investigations of the student; but in no branch of science is it applicable under more difficulties than in Therapeutics, provided we are desirous of establishing such classification on the precise operation of medicinal agents; whilst nothing is more easy than to form a natural classification of them, founded simply on the three great kingdoms of nature to which they belong. Both these modes of classification, termed respectively the *Therapeutical* and the *Natural Historical*, have been detailed in all their varieties in works on Materia Medica and Therapeutics. Classifications of medicinal agents, based on their operation, are numerous, and, at the same time, by no means satisfactory. Immense labor, and, of course, valuable time, have been spent upon the subject, without much fruit. It has been already said, that all remedial agents, which are possessed of activity, must belong to one of two classes,—*stimulants* or *excitants*, and *sedatives*; we must except, however, certain agents, whose effects are purely chemical or mechanical, or which are not employed to effect any changes in the living tissue. Perhaps the best of all classifications would be one founded upon the agency exerted on the different tissues; but this arrangement, in the present state of science, is by no means easy; and, moreover, the action of medicines is so associated with certain terms,—as narcotics, tonics, sedatives, &c., employed to denote certain operations, which they are esteemed capable of producing, that, to abandon them, would be to throw obstacles in the path of the student, without the ultimate advantage accruing to him of possessing a better knowledge of the *modus operandi* of medicines, than when a classification, somewhat resembling those usually embraced, is adopted. The classification of M. Barbier is founded upon the tissues affected, but it is extremely incomplete, and unsatisfactory, and, in consequence of the impracticability experienced by him of grouping the various agents under appropriate heads, his last unmeaning division is, of course, a large one.

M. BARBIER'S CLASSIFICATION.

MEDICINES	Which strengthen the tissue of organs, . . .	1. *Tonics.*
	Which stimulate the tissue of organs, . . .	2. *Excitants.* 3. *Diffusibles.*
	Which relax the tissue of organs, ...	4. *Emollients.*
	Which moderate too great activity of organs, . .	5. *Temperants.*
	Which diminish cerebral life, ...	6. *Narcotics.*
	Which irritate the inner surface of the intestines, .	7. *Purgatives.*
	Which irritate the gastro-duodenal surface especially,	8. *Emetics.*
	Which disturb the natural movements of the intestines,	9. *Laxatives.*
	Whose modus operandi is not determined, or which cannot be included in the preceding classes.	10. *Incertæ sedis.*

One of the most modern classifications is that of Dr. A. T. Thomson, founded upon the classifications of Dr. Thomas Young and Dr. Murray. It, also, is liable to the objections, which must apply to all attempts to reduce the multitude of medicinal agents to anything like a scientific arrangement, as well as to others, which appertain to it exclusively.

It is as follows:—

DR. A. T. THOMSON'S CLASSIFICATION.

I. VITAL AGENTS.

A. Influencing the body generally:		
a.—By operating directly upon the nervous system.		
* *Increasing action*, ...		Excitants.
** *Diminishing action*, ...	*Primarily*,	Sedatives. Refrigerants.
	Secondarily,	Narcotics. Antispasmodics.
b.—On the Muscular and Sanguiferous systems:		Tonics. Astringents.
c.—On the Secerning system:		Errhines. Sialagogues. Expectorants. Emetics. Cathartics. Diuretics. Emmenagogues. Diaphoretics.
B.—Influencing the body solely by their action on the part to which they are applied:		Epispastics. *a. Rubefacients.* *b. Vesicants.* *c. Actual cauterants.*

II. CHEMICAL AGENTS.

A.—Influencing the state of the body, or its contents, by their chemical properties :

* *Acting on the surface,*	Escharotics. *a. Potential cauterants.*
** *On the contents of cavities,*	Antacids. Antalkalies. Antiseptics. Antilithics.

III. MECHANICAL AGENTS.

Demulcents.
Diluents.

To the three great divisions of Dr. Thomson no objection need be urged; but when the different subdivisions, and the ascribed *modus operandi* of many of the classes are considered, much room is found for difference of sentiment. It may be observed by anticipation, that there is no adequate ground for placing *Excitants* amongst those agents that operate directly on the nervous system; and *Tonics* amongst those that act on the muscular and sanguiferous system; nor is it readily seen, how *Epispastics* can be regarded as the only agents, that influence the body *solely* by their action on the part to which they are applied. The class of *Anthelmintics*, which could not have fallen conveniently under any of Dr. Thomson's subdivisions—with the views, which he probably entertained, of the mode in which their therapeutical agency is exerted—has been wholly omitted; and although anthelmintic virtues are assigned to the ordinary medicinal agents, that are conceived to possess such virtues, when these agents are referred to under other heads,—it is singular, that the class is neither mentioned in the table, nor in the body of the work. It seems to have altogether escaped Dr. Thomson's attention.

In the last edition of his valuable "Encyclopædia of Materia Medica," for so the work has been appropriately termed by him, Dr. Pereira has attempted—to employ his own diffident expression—a new physiological classification of the articles composing the Materia Medica, but has, at the same time, stated his conviction of the insuperable difficulties in the way of a satisfactory and unobjectionable arrangement of medicines on a physiological basis. His classification —partly founded on some of the modern German arrangements—has the merit of bringing together systematically the most important agents, although well-founded doubts may exist as to the propriety of positions, which he has assigned to individual articles; and still more so as to the necessity of many of the subordinate heads introduced by him.

DR. PEREIRA'S CLASSIFICATION.

Class I. Topical remedies acting mechanically.	Mechanical antidotes. Mechanical purgatives and anthelmintics. Dentifrices.
Class II. Topical remedies acting chemically.	Caustics. Astringents. Chemical antidotes. Disinfectants.
Class III. Topical remedies acting dynamically.	Acrids. Emollients.

- Class IV. Hæmatics or remedies acting on the blood.
  - *a.* Physically.
    - Diluents.
    - Inspissants.
  - *b.* Chemically.
    - Spanæmics or impoverishers of the blood.
    - *a.* Thirst-quenching and refrigerant.
    - *b.* Resolvents or liquefacients.
      - 1. Alkalines.
      - 2. Salines.
      - 3. Iodics and bromics.
      - 4. Sulphurosa.
      - 5. Mercurialia et antimonialia.
    - *c.* Antispasmodic.
    - *d.* Plumbeous or saturnine.
  - *c.* Dynamically.
    - Hæmatinics or enrichers of the blood.
- Class V. Pneumatics or remedies acting on the organs of respiration.
  - Affecting the muscles of respiration.
  - Affecting the aërian membrane.
  - Diminishing the want of breath.
  - Influencing the calorific functions.
  - Refrigerants.
- Class VI. Neurotics or remedies acting on the nervous system.
  - 1. Cerebro-spinals.
    - 1. Affecting the mind; phrenics.
    - 2. Affecting sensibility; æsthetics.
      - *a.* Strengthening it; hyperæsthetics.
      - *b.* Lowering it; anæsthetics.
    - 3. Affecting voluntary and reflex spinal movements; cinetics.
      - *a.* Affecting the tonicity of muscles.
        - *aa.* Augmenting it; tonics.
        - *bb.* Depressing it; relaxants.
      - *b.* Affecting the irritability of muscles.
        - *aa.* Augmenting it; spastica.
        - *bb.* Diminishing it; paralytica.
      - *c.* Affecting volition.
      - *d.* Affecting the reflex spinal functions.
    - 4. Affecting sleep; hypnics.
      - *a.* Causing it; hypnotics.
      - *b.* Preventing it; agrypnotics.
  - 2. Ganglionics.
    - 1. Affecting the heart and arteries.
      - *a.* Exciting them; stimulants.
        - *aa.* Ethereo-oily vegetables.
        - *bb.* Resinous.
        - *cc.* Ammoniacal and empyreumatic.
        - *dd.* Animal excretions.
        - *ee.* Phosphorus.
        - *ff.* Spirituous and etherial.
      - *b.* Depressing them; sedantia.
    - 2. Affecting the alimentary canal.
- Class VII. Cœliacs or remedies acting on the digestive organs.
  - 1. Enterics; anthelmintics.
  - 2. Hepatics.
  - 3. Splenics.
  - 4. Sialics and pancreatics.
- Class VIII. Eccritics or remedies acting on the excernent system.
  - 1. Augmenting secretion.
    - 1. Errhines.
    - 2. Expectorants.
    - 3. Emetics.
    - 4. Cathartics.
    - 5. Diaphoretics.
    - 6. Sialagogues.
    - 7. Cholagogues.
    - 8. Diuretics.
  - 2. Diminishing secretion.
  - 3. Altering the quality of the secretions: lithics.

Class IX. Genetics or remedies acting on the sexual organs.	1. Affecting the organs, aphrodisiacs, anaphrodisiacs. 2. Affecting the uterus, emmenagogues, ecbolics.

The divisions and subdivisions of this table are sufficiently ample; and Dr. Pereira was enabled—which is of great moment—to introduce every potent article into some one of them; although it may be questioned, whether the position has been selected in all cases correctly. Under "resolvent or liquefacient spanæmics," for example,—the *liquefacientia* (verflüssigende Mittel) of Plagge and other German therapeutists—he places, alkalines, salines, iodics and bromics, sulphurous agents, mercurials, and antimonials. Arsenic is not there; nor are there other articles which modify nutrition, and were, in older periods, enumerated, with many others, as "alteratives." Arsenic appears under the sub-order *spanœmica antispasmodica* along with sulphate of copper, ammoniated copper, nitrate of silver, trisnitrate of bismuth, oxide of zinc, and sulphate of zinc. Under the head of arsenious acid, however, he remarks:—"on the whole it is impossible, I conceive, in the present state of knowledge, to designate the medicinal effect of arsenic by any term, which shall briefly but characteristically declare its physiological properties. The terms *tonic* and *antispasmodic* are quite insufficient for the purpose: nor am I satisfied with the designation *antispasmodic spanœmic* before given to it."

The evidence derived from our knowledge of the *modus operandi* of the different agents classed under the resolvent or liquefacient, and the antispasmodic spanæmics, appears to be insufficient to establish such sub-orders. All that we seem to know of the remedial agency of the former is, that they modify nutrition, in all probability through some change impressed by them on the blood, and through it remove the different forms of dyscrasy in which they have been found efficacious; but that they do this as "spanæmics" or "impoverishers of the blood," or as "liquefacients" of the morbid formations, appears to be wanting in confirmation, and even in probability.

In regard to "antispasmodic spanæmics," the more the action of reputed antispasmodics is investigated, the more clear it is, that we are not possessed of any agents that can be considered to be endowed with positive antispasmodic virtues. Spasm—as will be shown hereafter—is primarily a nervous phenomenon, which may be the result of a sthenic or an asthenic condition; so that remedies, possessed of antithetic effects as vital agents, may be entitled, according to the condition of the system, to the epithet "antispasmodic."

To the following classifications of the author, objections equally apply. He has already said, that it is impracticable to form any, which can be altogether unobjectionable. It has been more than once remarked, that all agents, capable of affecting the living tissue so as to modify its functions effectively, may be classed under the head of *excitants* or of *sedatives*. But, in addition to these—what may be called "*vital agents*," there are some other classes of medicines, which, in consequence of their effect being almost purely chemical, without modifying the condition of the living tissue, may be appropriately designated *chemical agents;* and, again, there is one other class, equally without direct influence on the vital manifestations, and acting simply or chiefly on the mass of humors—which may be properly ranked under the denomination of *mechanical agents.*

This is probably as simple a classification as can be made, and one altogether intelligible to the student. It does not involve questions connected with the intimate *modus operandi,* which must necessarily engage attention in considering the different classes; whilst it embraces classes not admitted into the arrangement of Dr. Thomson, and which comprise some of our most useful medicinal agents. The class of *Anthelmintics,* in the sense of "medicines, which prevent the generation of entozoa within the body," is placed next to the class of tonics; because the predisponent cause of their unusual multiplication is a want of tone in the system generally, and of the stomach in particular; and if we confine our attention to the destruction of these parasites by true anthelmintics, or, in other words, by agents directly destructive to entozoic life, we do but little,—the most important step being to remove the predisposition to fresh generation. As, in the case of intermittent fever, the main object of the practitioner is less directed to the condition of the patient during the paroxysms, than to the prevention of their recurrence.

THE AUTHOR'S CLASSIFICATION.

I. Vital Agents.	*Excitants.*	Increasing action generally, or locally, or both.	Excitants proper. Tonics. Anthelmintics. Astringents. Emetics. Cathartics. Emmenagogues. Abortives. Diaphoretics. Errhines. Sialagogues. Diuretics. Expectorants. Sorbefacients. Revellents. Antispasmodics.
	Sedatives.	Diminishing action directly or indirectly.	Sedatives proper. Narcotics. Refrigerants. Nauseants.
II. Chemical Agents.	. . . .		Antacids. Antalkalies. Antilithics. Disinfectants.
III. Mechanical Agents.	. . . .		Demulcents. Diluents.

This was the classification adopted by the author in the first edition of his "*General Therapeutics;*" but he has found it convenient to embrace one that harmonizes more with the arrangement adopted in his "*Practice of Medicine.*" The different classes of therapeutical agents, and the agents themselves, will be, therefore, investigated in the following order:

Agents that affect prominently the alimentary canal or its contents,	Emetics. Cathartics. Anthelmintics.
2. Agents that affect prominently the respiratory organs, . .	Expectorants.
3. Agents that affect prominently the glandular organs, . .	Errhines. Sialagogues. Diuretics. Antilithics. Diaphoretics.
4. Agents that affect prominently the nervous system,. . .	Narcotics. Tetanics. Antispasmodics.
5. Agents that affect prominently the organs of reproduction, .	Emmenagogues. Parturifacients.
6. Agents that affect various organs, ...	Excitants. Tonics. Astringents. Sedatives. Refrigerants. Revellents. Eutrophics.
7. Agents whose action is prominently chemical,. . . .	Antacids. Antalkalies. Disinfectants.
8. Agents whose action is prominently mechanical, . . .	Demulcents. Diluents.

SECTION I.

AGENTS THAT AFFECT PROMINENTLY THE ALIMENTARY CANAL OR ITS CONTENTS.

I. EMETICS.

SYNON. *Vomitoria.*

Definition of Emetics—Nauseants—Their modus operandi—Therapeutical application—Physiology of vomiting—Modus operandi of emetics—Effects on the stomach, and general system—Evils of their too frequent employment—Therapeutical application—Special emetics.

EMETICS have been defined, "agents, which by the excitant effect they produce upon the stomach give occasion to vomiting;" but this definition is meagre and unsatisfactory. That of Dr. Paris is to be preferred:—"Substances which excite vomiting, independently of any effect arising from the stimulus of quantity, or of that occasioned by any nauseous taste or flavor."

The physiology of vomiting has, of late years more especially, engaged the attention of some of the most accurate anatomists and physiologists. At one time it was universally conceived, that the stomach is the main—indeed, the sole—agent; whilst, at an after period, the opposite view was maintained, and the stomach was denied any agency whatever in the result. The intimate consideration of this topic of physiology has been gone into in another work (*Human Physiology*, 8th ed. i, 198, Philad. 1856), and it is not necessary to repeat it here. It may be observed, however, that the former of the theories referred to, which prevailed of old, is full of error, and ought to be discarded; and that, as often happens, when exclusive and antagonistic views are maintained, the truth probably lies between them, or may consist of a combination of both. From a careful examination of what has been said on both sides of the question, it appears that we are justified in inferring, that the stomach, of all the organs concerned, is the one whose action is least energetic and indispensable; that the pressure, exerted on its parietes by the diaphragm, and abdominal muscles, is the most powerful cause; as it is found that the more or less complete paralysis of the diaphragm, or the destruction of the abdominal muscles, renders vomiting much more feeble, and more slow in manifesting itself.

When an emetic has been taken in a sufficient dose, a train of phenomena makes its appearance contrasting greatly with those that follow. An indescribable sensation is first of all experienced, which is chiefly referred to the region of the stomach, and consists of a feeling of anxiety, and of circumgyration, which extends also to the head; a copious flow of saliva and of sweat takes place, with paleness of the surface, and, indeed, every sign of diminished nervous and vascular action. This state of "nausea," as it is termed, is manifestly one of debility, or of diminution of the vital powers; and, when it has continued for any length of time, is usually succeeded by a very different condition of the functions; the diaphragm and abdominal muscles are thrown into violent contraction; an inverted action of the muscular coat of the stomach is produced; and, under these combined actions, the contents of the stomach are ejected. During this state of excited action, the pulse assumes fresh vigor: the skin becomes florid, especially that of the face; a copious, warm perspiration takes the place of the cold, clammy sweat of nausea, and all is energy where depression previously prevailed.

It is obvious, then, that the therapeutical effects of substances, capable of exciting emesis, most vary according as they are administered to keep up nausea, or given in doses sufficient to induce emesis; and, again, that emetics may differ amongst themselves according as their operation is preceded or not by more or less nausea.

Where the nauseant operation is alone induced, the effects of the remedy are so different as to demand a separate consideration.

I. NAUSEANTS.

The state of nausea being one of reduced action, it can be readily understood, that a sedative agency, thus induced, and kept up for a sufficient length of time, may succeed in subduing inflammation, and the morbid exaltation of organic actions which constitutes ordinary fever. These results can be accomplished by nauseating remedies properly administered.

From the effects which nauseants are capable of inducing, their therapeutical application will be sufficiently obvious; and, accordingly, but little difficulty is experienced by the practitioner in laying down his indications, or in carrying them into effect, by some one or more of the numerous nauseants, which are contained in the catalogues of the materia medica.

With regard to the condition of the functions under the influence of a nauseant,—when pushed to the extent of inducing marked nausea,—there can be no difference of opinion; but it has been a question, whether, if these same agents be given so as to fall short of inducing nausea, or any sensible evidences of their action,—in *alterative* doses, in other words,—they may not modify the functions in the same manner as full nauseants, but to a less degree. A great deal may be said in favor of the affirmative view of this question, but it is one obviously not easy of demonstration. Were we, indeed, to deny the position altogether, it would be difficult to account satisfactorily for the operation of antimonials, or of many other reputed diaphoretics in small doses, which are emetic in larger.

All admit that, when tartrate of antimony and potassa is given so as to produce nausea, it is a decided sedative and diaphoretic,—diaphoretic because sedative. The state of nausea being, as already remarked, one of diminished action,—the exalted vital manifestations, constituting fever, are reduced by it; and diaphoresis, which had been checked by the febrile irritation, is restored. In this case, the antimonial,—like every diaphoretic,—is an indirect agent only. But if it be given in doses somewhat smaller than are requisite to induce nausea, it can be conceived that an action of sedation may be exerted, although, it must be confessed, that we have no sensible evidence of such an effect except the result; and it must be equally confessed that, in our uncertainty, we ought scarcely to place that confidence in those agents, which is occasionally reposed in them by practitioners. Fortunately, however,—as remarked under another section, in regard to antimonials especially,—this very confidence is, at times, followed by negatively beneficial results. It prevents the partisans of the perturbating treatment of fever, by means of violent and repeated cathartics, from causing as much irritation as they might otherwise do; and gives the patient a little of that quietude and absence from disturbance, which is so important in the management of all febrile cases, and especially of such as are accompanied by erethism in the mucous membrane of the intestines.

Therapeutical application of Nauseants.

Internal inflammation.—In all internal inflammations, nauseants are obviously proper, as well as in every kind of active hemorrhage;—whenever, indeed, it is desirable to diminish the force and velocity of the circulatory movements. In such cases, they are amongst our most valuable therapeutical means, and, if the system can be kept, for any length of time, sufficiently under their influence, the local hyperæmia will often yield, after it has resisted other agencies. In a case of pericarditis, which fell under the author's care, and which threatened fatal results, the acetate of morphia was administered in a full sedative dose;—this salt being preferred to opium in consequence of the latter disagreeing in the particular case: the nausea, caused by it, was intense; but the symptoms were so much ameliorated, that the dose was repeated: in this way, the nausea was kept up for forty-eight hours, and, during the condition of sedation, the inflammatory signs disappeared, and the patient doubtless owed her safety mainly to the nauseant agency.

Constipation.—In constipation, a union of nauseants with cathartics becomes occasionally advisable, and at times effectual, after cathartics alone have been employed unsuccessfully. If the constipation be dependent upon any irritated condition of the exhalants of the canal, the use of debilitants,—such as those now under consideration,—reduces the erethism, and facilitates the operation of the purgative. Whenever, too, it is desired to break in upon a morbid chain, and especially in the neuroses, nauseants may be beneficially administered: but, in these cases, the revulsion, induced by a nauseating emetic, is generally preferred, in consequence of the more powerful impression which it makes on the nervous system. The subject will, however, be fully canvassed, under the heads of EMETICS, and REVELLENTS. The practitioner has, in all cases, to reflect, whether the state of the organic actions be such as to require the debilitant agency, which nauseants are capable of exerting; and it is not generally difficult to arrive at a correct conclusion. Perhaps, in all cases, the tartrate of antimony and potassa is capable of fulfilling every desire of the physician; but, occasionally, other articles are selected; —ipecacuanha by some; squill—particularly when the affection is seated in the air-passages—by others; but there is not sufficient reason for the belief, that any nauseant is preferable to the tartrate of antimony and potassa; and, moreover,—being devoid of any stimulating property,—it can be administered in many cases, in which the exciting emetics would be obviously improper.

Surgical cases.—With similar views to those that impress the physician the surgeon has recourse to nauseants. Whenever it is desirable to depress the energies of the system, and to induce relaxation of constricted parts, they are advantageously employed. In strangulated hernia, tobacco smoke, or tobacco infusion is thrown into the rectum; but, as will be shown hereafter, the use of tobacco, even in this form, is not devoid of danger; and, perhaps, there is no relaxant effect produced by it, which might not be equally produced by the nauseants above mentioned.

When a luxated limb has to be reduced, the force of contraction of the muscles is diminished during the existence of nausea; and if the surgeon, at the time, employs his *manœuvres* dexterously, he may succeed in effecting the reduction.

Obstetrical cases.—To the obstetrical practitioner nauseants are not less useful. When tartar emetic is given so as to impress the system, it removes rigidity of the os uteri; and in violent or irritable labor, the inordinate activity of the uterus is allayed by it, whilst the dilatation of the mouth of the organ is facilitated. Dr. Kennedy, of Dublin, has drawn the attention of practitioners to these cases, as well as to the value of nauseants in puerperal convulsions, in obstructed and inflamed mammæ, and in puerperal mania.

But it is needless to attempt to point out every affection in which nauseants may be employed with advantage. By bearing in mind the sedative influence they are capable of exerting, the practitioner can meet with little difficulty in deciding upon the cases in which their exhibition may be noxious or salutary.

II. EMETICS.

In order that an emetic shall produce its effect upon the stomach, it must affect the cerebro-spinal axis. Should it irritate the nerves of the stomach, that irritation must be appreciated by the nervous centres, and a reflex action be exerted upon the stomach, before it can discharge its contents. It is not necessary, however, that the impression should be first made on the gastric nerves. Certain sources of irritation, seated elsewhere, may impress the nervous centres by their irradiations, and produce the same effect.

Various circumstances affecting the nerves of the stomach may excite vomiting;—for example, the administration of substances belonging to the class of emetics; over-distension of the organ; offensive character of food; morbid secretions from the supra-diaphragmatic portion of the alimentary canal, or from the stomach itself; reflux of bile into the stomach, &c. &c. In these cases, the impression is made upon the nerves of the stomach; thence it passes to the nervous centres, which appreciate the sensation, and call upon the different organs concerned in vomiting to execute their functions.

But numerous cases present themselves, in which the impression is first made on other parts than the stomach, and where it equally proceeds to the nervous centres, which then call for the action of the appropriate organs: thus, the stomach sympathizes with an organ that has been long suffering under chronic irritation. There is, indeed, scarcely an organ in the body, which, when affected with protracted suffering, does not disorder the functions of the stomach, and induce vomiting. The irritation of the uvula, when elongated, and the presence of tenacious phlegm in the posterior nares, bring on a kind of "*gagging*," which is occasionally followed by full vomiting. We have examples, also, in which the nervous impression is even more remotely connected with the effects than in those selected. The sight of a disgusting object will "*turn the stomach*" of many. The same may be said of nauseous smells, and flavors; of riding, sailing,—especially at sea; swinging, &c. In all these cases, the impression is made on the nerves,—the great nervous centres being primarily or secondarily affected. Did it indeed admit of the slightest question, that the nervous centres must always be implicated in the act of vomiting, the circumstance, that if their impressibility be blunted by narcotics, it is excessively difficult to excite vomiting,—a fact which has to be borne in mind when the therapeutist is called upon to act in cases where narcotics have been taken as poison,—would tend to establish the affirmative.

In many cases, the effect of an emetic agency—although apparently produced with inconceivable rapidity—must be the result of a very complex and reflex operation. When, for instance, pain in a distant organ sickens, the afferent nerves must convey the impression from the affected organ to the vesicular matter in the centre of the spinal marrow,—thence a reflex action must take place to every part of the surface of relation, and the gastric nerves be specially impressed, and call on the nervous centres, to send the nervous influx to the organs particularly concerned in the act of vomiting.

When vomiting has continued for some time, accompanied by violent retching, more or less bile is always evacuated,—the inverted action of the stomach being extended to the duodenum; and the irritation, produced in the alimentary canal, being propagated along the biliary ducts to the liver; so that the secretion from it becomes augmented. It is a common belief, that where bile is discharged during vomiting, induced in this or in any other way, it is a proof, that the person is—what is termed—"*bilious;*" but, for the reasons just assigned, it may be no more than an evidence that emesis has taken place with retching. In violent mischief affecting the intestinal canal—as in cases of *colica ileus*—the inverted action extends even as low down as the large intestine; fæces are made to clear the ileo-cæcal valve, and are discharged by the mouth, giving rise to the alarming phenomenon of stercoraceous vomiting; but this never occurs from the administration of an emetic. It is always an index of serious lesion or obstruction of the intestinal tube.

The action of an emetic is local as regards the stomach; but it extends to almost every organ of the body. It has been already said, that its effect is that of an excitant to the nervous and sanguiferous systems, causing the blood to circulate more freely through the capillary vessels; and, in this way, trifling obstructions may be removed; but if the obstruction amounts to hyperæmia, and especially if this latter condition exists to any great extent, it may be increased by it. In all the varieties of hyperæmia that characterize local inflammation, there is, as the author has attempted to show, an over-distended and atonic condition of the extreme vessels, induced by the blood having been sent into them, under some source of irritation, in undue quantity. This over-distended state of capillaries gives occasion to remora of blood in them, and excites the vessels, communicating with them, to inordinate action; and it is obvious, that if, in such a state, a remedial agent be administered, whose effect is to hurry the circulatory fluid towards the affected parts, the hyperæmia may be augmented. Accordingly, it might be supposed, that emetics would act injuriously, when any of the internal organs are laboring under inflammation. This would seem, indeed, to be a general principle of therapeutics, and to be especially applicable to inflammation of those viscera, which are more particularly affected in a mechanical manner during the operation of vomiting; but exceptions can be readily imagined; or rather there may be modifying circumstances, which may be urged against its universality. In active inflammation, for example, there is more or less concentration of the vital energy towards the inflamed part; but the effect of the operation of an emetic is to propel the blood towards every organ of the body, and thus to equalize the circulation.

From some experiments, recently instituted by MM. Aug. Duméril, Demarquay, and Lecointe, it would appear that, as regards the effect of emetics on the function of calorification, there is some difference. Whilst the sulphate of copper, in six experiments on dogs, always depressed the temperature; the tartrate of antimony and potassa, in small doses of a grain and a half, and less, injected into the veins, raised the temperature from some tenths of a degree, to 1·3° Centigrade, but in a larger dose—as seven grains—the temperature fell rapidly; in one case, as much as two degrees in two hours. With ipecacuanha, their trials with small doses were not sufficient to lead to very decisive conclusions;—in the quantity of seven grains, however, it occasioned a depression of 0·6° Centigrade, and in more considerable doses, a marked elevation of temperature. This difference in the action of these substances on dogs is worthy of being borne in mind by the therapeutist, and deserves farther investigation in regard to its application to man.

There is another effect of emetics, which enables us to produce positively beneficial results in internal inflammations of organs not immediately concerned in the act of vomiting; this is the revulsive,—one of the most important, indeed, of therapeutical influences. The stomach, and the organs more immediately concerned, are, in this way, made the centre of an artificial fluxion, which detracts from that existing in some other portion of the organism. Under this joint equalizing and revulsive agency, emetics are beneficially employed in certain inflammatory affections, notwithstanding their tendency to add to the hyperæmic condition;—the good, effected by the equalization and revulsion, largely preponderating over the injurious tendency in question.

During the efforts of vomiting, the abdominal viscera are compressed by the contraction of the diaphragm and abdominal muscles; hence the different secretions, that take place from them, are augmented; and a tendency to displacement results, so that hernial protrusions may be produced,—or increased, if already existing. The different procidentiæ, too, of the pelvic viscera are injuriously affected by the pressure, and if the female be impregnated, abortion may be occasioned: indeed, there are certain obstetrical physiologists, who think, that the extrusion of the child, in parturition, is altogether accomplished by the contraction of the abdominal muscles,—a position, which would not appear to be tenable. By placing the hand on the abdomen during one of the violent throes of labor, that viscus can be felt contracting energetically; can be seen, indeed, to do so, where,—as in France,—the clothes are thrown up at the termination of labor, in order that the *élèves* may have an opportunity of inspecting the phenomena connected with man's ingress into the world. Were it otherwise, there would seem to be no necessity for the development of muscular fibres, which is found to take place as the uterus becomes distended in utero-gestation.

In the efforts of vomiting, the circulation, as above remarked, becomes hurried, so that evil might result in those, who are laboring under aneurismal or other serious lesions of the heart and arteries; and instances are on record, where the vessels have given way during retching. The circulation through the lungs, as in every other part of the frame, becomes augmented in velocity; the secretions from the bronchial tubes are rendered more copious, and hence an emetic becomes an '*expectorant*'—an agent whose *modus operandi* will be inquired into hereafter. This effect is not facilitated solely in the manner described. The succussion, communicated to the lungs by the repeated contraction and relaxation of the diaphragm during vomiting, not only increases the secretion, but dislodges it when secreted, so that it becomes loose and more readily expelled by coughing. Hence it happens, that a hard, and dry cough is converted into one that is loose, and free.

In the accelerated action of the larger organs of circulation produced by vomiting, the capillary vessels participate; and a copious and warm perspiration usually supervenes, contrasting singularly with the cold, clammy perspiration of nausea. Hence, emetics become '*diaphoretics*.'

As to their effect on the stomach, they may simply evacuate its contents, which may consist of food taken in, with the secretions from the supra-diaphragmatic portion of the tube as well as from the organ itself. At times, these last secretions are morbid, and unless they are removed, they may become the source of irritation. This is especially the case in diseases accompanied with great erethism of the dermoid tissue. Whenever the cutaneous surface is extensively excited,—as indicated by great heat or by efflorescence,—the mucous membrane lining the stomach is apt to participate in the irritation, so that secretions of a morbid character take place from it: these secretions can be readily removed by the action of a gentle emetic. It is easy to see, however, that, under the stimulation produced by emetics of powerful action, the lining membrane of the stomach must be more or less excited, and hence a copious secretion of the mucous fluid takes place; mucus is observed to be mixed with the rejected matters; and, for the reasons already assigned, bile is generally present. But if substances too irritating, or too violent in their action, be administered, the membrane may become inflamed, and true gastritis or gastro-enteritis result. It has been properly remarked by M. Broussais, that the specific character of emetics and purgatives is merely stimulation, which may terminate, if the dose be very large, in inflammation and ulceration of the digestive mucous membrane. The same author has well said, too, that the long-continued employment of stimulants—as emetics—greatly exalts the sensibility of the stomach, rendering the treatment protracted and difficult, and laying the foundation for repeated relapses.

Full vomiting, accompanied with much retching, or nervous concentration on the stomach, promotes both exhalation and absorption. The cutaneous transpiration is augmented, as it is in the precursory state of nausea; but the perspiration, induced at these two periods, is essentially different. In the former case, it is the healthy energetic action of vessels, similar to that which takes place in rude health under the agency of exercise or external warmth: in the latter, the whole system is laboring under temporary debility; and the cold, clammy exudation sufficiently exhibits the diminished activity of the vital forces.

Absorption is effected by the same class of agents; but with regard to the precise mode in which the result is produced, therapeutists differ. It cannot be because of the augmented secretion which takes place from the lining membrane of the stomach, for that is to a trifling amount;—so trifling, indeed, that it could not be expected from this cause, that any unusual demand would be made upon the absorbents of any part of the system. We can account for absorption being more energetically exerted in cases of dropsy, after the administration of agents, as hydragogue cathartics, which occasion a greater separation of the watery parts of the blood, or after blood has been taken from the vessels; because here the quantity of circulating fluid being diminished, a more ready imbibition of the fluid of dropsy is effected; but this explanation does not apply well to the operation of emetics. It will be shown hereafter that the nervous system is largely concerned in the operation of certain agents that modify the function of nutrition; and this is probably the case in vomiting. The powerful nervous concentration on the stomach, and the different organs concerned in vomiting, interferes probably with the functions of nutrition and secretion in other parts of the organism, so that less fluid may be exhaled, whilst that, which has already been deposited, passes through the coats of the bloodvessels by imbibition, and gains the fluid of the circulation. This modification of nutrition is exemplified in the disappearance of morbid growths under the touch of royalty, the wand of the magician, and the incantations of the impostor.

From what has been said, it will be readily inferred, that emetics, like local stimulants in general, are valuable revellents; although, owing to the powerful effects they produce on the vascular and nervous systems, they may not be susceptible of such useful applications as cathartics, whose operation is more circumscribed. In head affections, for example, whilst cathartics are of great advantage by deriving from the encephalon, and occasioning a salutary excitation in the lining membrane of the bowels, emetics may be of doubtful propriety, owing to the violence of their operation forcing the blood toward the encephalon, and endangering the augmentation of any hyperæmic condition, that may be existent there. Still, in the opinion of many, no mischief,—but rather advantage,—accrues in those very cases from the use of emetics.

Emetics differ greatly in the period that elapses between their administration and operation, and also in the degree in which they induce nausea. The sulphates of zinc and copper, for example, act speedily; whilst the tartrate of antimony and potassa, or ipecacuanha, requires fifteen or twenty minutes. This fact has given rise to a division of emetics into *direct* and *indirect*, or in other words into such as are conceived to act by impressing the nerves of the stomach primarily; and such as exert their agency, in the first instance, on the great nervous centres themselves.

An agent of the first class is presumed to excite such a disagreeable impression upon the nerves of the mucous coat of the stomach, that the brain immediately calls for the assistance of the different muscles concerned in vomiting, and the contents of the stomach are at once evacuated; or repeated efforts are instantaneously established to effect their expulsion.

On the other hand, an agent of the latter class is presumed to excite no immediately disagreeable impression upon the gastric nerves, but gives occasion to the act of emesis by passing into the circulatory apparatus of the stomach; impressing the nerves distributed to the lining membrane of the bloodvessels, or reaching the nervous centre, and making its first impression upon that part; and the fact that many substances,—as the tartrate of antimony and potassa,—which, as regards its agency on the stomach, is equally soluble with the sulphate of zinc or copper,—require such a length of time before their effects are produced, compared with those last salts, is favorable to the latter opinion. Only one other view could indeed be indulged, and it is sufficiently difficult of comprehension;—that in the case of the salt of antimony a more protracted impression on the gastric nerves is required than in that of the salt of zinc; yet how this can be effected by a solution, capable of such ready absorption, is by no means clear.

The rapid emetics, as a general rule, excite the least nausea, and their action is soonest over. The vegetable emetics are generally attended with more nausea than the mineral; although the tartrate of antimony and potassa, which requires about the same time before its operation commences, is considerably nauseant; and is more frequently employed to excite nausea, where such agency is demanded, than any other substance belonging to the class. The effects of substances, which require time for action, supervene more gradually, and continue longer. As a general rule, too, the rapid emetics are not productive of as much retching as the others; and hence a judicious selection of a particular emetic for a special morbid condition, or to fulfil a certain indication, may be important. Where the object is simply to evacuate the contents of the stomach, a rapid emetic, and one that is neither accompanied in its action with nausea nor retching, is indicated. On the other hand, where a powerful nervous impression has to be made, one of an opposite character is demanded. Hence it is, that if a noxious substance be taken into the stomach, recourse is had to the sulphate of zinc or the sulphate of copper; whilst in an attack of intermittent, where we are desirous of more powerfully impressing the nervous system, the tartrate of antimony and potassa, or ipecacuanha, or a combination of both, may be selected.

When an emetic is given for the purpose of simply evacuating the contents of the stomach in disease, fluid—as warm water, or warm chamomile tea, or mustard and water, or a few drops of solution of ammonia in water—may be used, especially after each act of vomiting, for the purpose of preventing retching. The fluid must, however, be allowed in moderation; and, where a soluble poisonous article has been taken, but little should be permitted, unless it can be removed from the stomach by the stomach-pump immediately after it has been swallowed, or is likely to be evacuated at once under the action of the emetic. Hence, "dry vomiting" is advised in such cases. Where the tartrate of antimony and potassa is administered to children as an emetic, it may be well to allow the child to suck or drink before the operation comes on, as the salt, it is asserted, has been found to produce poisonous effects, when taken on an empty stomach.

In his "*Essays on Infant Therapeutics,*" Dr. J. B. Beck has properly remarked, that whilst the mild emetics may be given to infants with entire safety, those of an active debilitating character, and which produce much nausea, are more uncertain and energetic in their effects than in the adult. The articles to which he alludes are antimonial emetics, which "are frequently hazardous to young children, and that, too, when used in doses not peculiarly large."

Occasionally, the emetic acts for a longer time, and more severely, than is desirable. In such cases, a few drops of laudanum, or of laudanum and ether; or a teaspoonful of brandy; or a drop of creasote, may be prescribed. A teaspoonful of magnesia in a glass of sherry wine has been advised with the same object. These excitants are not often, however, needed. Frequently, a mustard plaster to the pit of the stomach is adequate to the emergency.

If the object of the practitioner be to excite a new nervous impression, the greater the amount of retching, within due limits, the better. At times, emetics not only produce emesis, but they excite violent catharsis; or they may induce the latter effect without the former. In such cases a few drops of laudanum have succeeded in restricting their operation to the stomach. In very irritable individuals, too, the emesis may go to an inordinate extent, so as to exhaust by the repeated retching and vomiting. Carbonic acid,—as contained in soda water, or as given off by the union of citric or tartaric acid and carbonate of soda,—or opium, or some topical rubefacient to the epigastric region, may be required to check it.

Reference has been made to the evils resulting from the repeated employment of emetics as regards the gastric functions, as well as to the mischief they may induce in particular states of the system. One other inconvenience resulting from them,—or rather, said to result from them, but of which the author has not seen an example, —is that of inflammation of the extremities, followed by gangrene. M. Barbier—an eminent French writer on Therapeutics—has cited the following case. A woman, of a constipated habit, had used many means for producing catharsis, but ineffectually; when a surgeon to whom she applied administered a violent preparation, which operated both upwards and downwards. Cramps, convulsions of the limbs, and great anguish supervened. Immediately afterwards she was attacked with severe lancinating pains of the extremities, and ecchymoses appeared on different parts of the body. Gangrene attacked the cartilaginous portion of the nose, the lower lip, the skin of the chin, the points of the two toes of the right foot, and the great toe of the left, all of which successively dropped off. To this case M. Barbier adds one of his own. A woman of the Faubourg d'Amiens, having procured a cathartic remedy from an herbalist, was attacked with vomiting and purging, which rapidly reduced her strength. She was taken to the Hôtel-Dieu. Next day, the point of the nose, the ears, and the cheeks became of a deep violet hue, and soon afterwards the same color spread over the feet and the hands, and gangrene rapidly attacked all these parts. She lost one of her feet, and several toes of the other.

These cases do not seem to prove incontestably, that the gangrene was dependent upon the use of emetics. The effects may have been coincident, instead of consequent; and, if any such evil were to be apprehended from them, we ought assuredly to have on record a greater number of examples.

Therapeutical Application of Emetics.

After this full investigation of the general effects consequent on the administration of emetics, their therapeutical application to particular diseases will be intelligible.

Intermittent fevers.—In intermittent fevers, they are employed with two objects,—either to excite a powerful nervous impression, or to simply evacuate the contents of the stomach; and, according as the practitioner has one or other of these objects in view, he selects his particular emetic.

For exciting a powerful nervous impression, one which produces much nausea and vomiting is, as already inculcated, to be preferred; whilst, if simple evacuation be desirable, it matters not how trivial the nausea or disorder may be. Practitioners, however, generally have recourse to the tartrate of antimony and potassa, and ipecacuanha, singly or combined. The latter is perhaps the more certain agent; and it has the advantage, that no very great attention is required to the dose,—sixty grains not usually producing more effect than thirty.

Where the object is to arrest the paroxysm of an intermittent, the emetic should be exhibited a short time before the cold stage is expected; and should it even not have the effect of completely preventing the fit, it may essentially mitigate it.

The first impression made by an emetic of antimony, or of ipecacuanha, is one of diminished action; the second is one of equalization; so that although the former operation might appear inappropriate in a case of diminished action, like that of the cold stage of an intermittent, the latter might be decidedly advantageous; and this latter, it would seem, predominates over the former, inasmuch as no evil is found to result from the employment of emetics in the cold stage. Even in those pernicious or congestive intermittents,—the *febres algidæ*, as they have been termed,—in which reaction, if established at all, is so with difficulty, they have been found decidedly useful. In such cases emetics, which produce the equalization without the depression, are obviously indicated—as sulphate of zinc, or sulphate of copper;—but those of the indirect kind have been exhibited with impunity, and even with advantage.

In the hot stage, emetics have likewise been given, but they seem to make less impression where all is exaltation, and they are, obviously, not so much indicated as when the action is to a less extent,—although nauseants may be highly useful.

The truth is, that during the paroxysm of an intermittent it is not generally required to do much. The management on general principles is alone necessary;—*hot* fluids being prescribed in the cold stage; *cold* in the hot; and *tepid* in the sweating.

In the state of apyrexia, emetics prepare the way for the administration of tonics, which are thus enabled to come into more immediate contact with the lining membrane of the stomach, and to exert their appropriate action on it, and through it, on the rest of the nervous system. In all periods of the affection, a gentle emetic, given merely to remove morbid secretions, may be advantageous, but their repeated use must be avoided.

Remittent fevers.—In remittent fevers, which are commonly accompanied by more or less excitation in the lining membrane of the stomach and intestines—especially of the upper portions—active emetics are not advisable; but gentle evacuants may be administered not only without detriment, but with advantage. Their repeated use, however, in such cases, is apt to augment the irritation already existing in the mucous membrane of the digestive tube, and to increase the sensibility of that of the stomach in particular.

Fevers in general.—From the equalizing effect of emetics, they may be used at the commencement of almost all fevers with advantage; and, at times, they would appear to cut short the complaint, although probably much less frequently than has been imagined.

In cases of *ephemera*, which occurs most frequently in children, but at times in adults also, and is dependent upon gastric disorder produced by errors in diet, emetics are obviously indicated; and, by removing the cause of the fever, they may put an end to the febrile action; but it is not easy to cut short a continued fever, after it has gone on for some days, by this, or by any other plan. Such, at least, has been the result of the author's observation, and it accords with that of others, whose opportunities have been extensive. In almost all fevers, termed 'continued,' two exacerbations in the day can be perceived;—the one, about mid-day, and the other, in the evening; and it has been conceived, that where the object is to cut short the fever, the emetic, as in the case of an intermittent, should be given a short time before the expected exacerbation, and especially before that in the evening, which is usually more marked than the other.

The *modus operandi* of emetics, in cutting short a continued fever, is the same as in the case of intermittents,—by the revulsion they produce; and the equalizing influence exerted by them on the sanguiferous and nervous systems. Hence, they are occasionally advantageous in the *major exanthemata*, especially when the eruption does not appear freely and equably, but seems to be restrained or repressed, in consequence of irritation existing in some internal organ. Broussais, with the dogmatism that is too apparent in his writings, lays down a law of action, which admits of many exceptions.—"Emetics cure gastro-enteritis solely by the revulsion, and the critical evacuations which they provoke; their effect is then uncertain in mild cases;

and, in severe ones, they are always dangerous, because they *never fail* to augment the inflammation, when they do not succeed in removing it."—Prop. 287. And, again;—"Emetics, purgatives, and tonics, which act by revulsion, effect only temporary cures in chronic gastritis and gastro-enteritis, and render the radical cure more difficult." Prop. 349;—"propositions," which must be regarded as mere assertions emanating from a distinguished source, but not on that account to be received as authority, in the absence of evidence.

It need scarcely be said, that in the course of continued fever, morbid secretions must take place from the lining of the alimentary tube as in remittents and intermittents, but as these can generally be evacuated by cathartics, they are usually employed to the exclusion of emetics.

Inflammations.—In the different phlegmasiæ, emetics are much used. In some, however, they are more effective than in others. In *laryngo-tracheitis* or croup, they are given in very different stages of the disease, to fulfil different indications, and with equal propriety. At the commencement of an attack, both of spasmodic and inflammatory croup, an emetic, by exciting a salutary revulsion and equalizing the circulation, frequently puts an end to the affection; and even if the disease has made some progress, it is a valuable agent arter bloodletting. Accordingly, it is one of the remedies most employed in the early stages of croup.

It is equally indicated after the plastic secretion has been thrown out from the membrane; but when it has formed in the trachea, it must obviously be a matter of extreme difficulty to cause the detachment of the false membrane, and its expulsion through the narrow chink constituting the rima glottidis; yet the best expectorant agency that can be exerted is effected by the succussion which the action of an emetic occasions.

The same remarks apply equally to the inflammation of the lining membrane of the larynx, that constitutes *laryngitis.*

In *amygdalitis* or inflammation of the tonsils, as well as in *pharyngitis* and *œsophagitis*, the same good effects are produced by the revellent and equalizing action of emetics; and when suppuration has supervened, and the abscess is seated so low down in the pharynx or œsophagus, that it cannot be reached by the instrument of the surgeon, the operation of an emetic may cause it to break. With this view, one of the direct emetics may be prescribed. No great impression on the nervous system is needed. The expulsive efforts are alone required; and the sulphate of zinc, or the sulphate of copper, is capable of fulfilling every indication. In the malignant varieties of *cynanche*, which so often accompany scarlatina, emetics are frequently administered. Much curative influence cannot, however, be expected from them, except at the very commencement of these affections; but at a subsequent period, they may be given with the view of removing the viscid secretions, which excite so much annoyance.

Diseases of the chest.—Emetics are much employed in different diseases of the chest. In *pneumonia*, they are not often used before the activity of vessels has been diminished by the proper antiphlogistic remedies; but when the inflammation has been somewhat subdued, their equalizing and revulsive influence becomes strikingly apparent. They favor the discharge of the bronchial secretions, by the succussion they communicate to the lungs; and, for this reason, they are employed with considerable benefit in *chronic bronchitis.*

They are, likewise, extremely beneficial in *nervous cough*, *hooping-cough*, and *asthma.* These diseases appear to be dependent upon a morbid condition of the nerves of the respiratory organs—the pneumogastric especially—which occasions contraction of the muscular fibres, that surround the minute bronchial ramifications; and this state of the nerves is generally perhaps connected with more or less derangement of the parts of the cerebro-spinal axis, whence they originate. Hence, the utility of producing a revulsive effect, by means of emetics or other agents. Expectoration is also favored by them in the manner just mentioned, and it has been long remarked, that those children suffer least from hooping-cough, who readily eject the contents of the stomach during each fit of coughing.

Diseases of the encephalon.—It is in head affections that the use of emetics might seem most doubtful. In *encephalitis*, they are generally esteemed inadmissible; and, as the pain in the head is almost intolerable, their operation can hardly fail to aggravate the symptoms, notwithstanding their revellent and equalizing tendency. The same remarks are applicable to their employment in *apoplexy.* As the violent efforts force the blood with great impetus to the head by the arteries, and retard its return by the veins, they appear inappropriate in cases in which hyperæmia already exists in the encephalon, yet their revellent properties would seem to have rendered them useful in *ophthalmia*, when bloodletting, counter-irritants, &c., had been prescribed, and the disease had, notwithstanding, remained stationary. In these very cases, the same substances, employed so that their operation may be confined to exciting nausea, are amongst our most valuable remedies, and not in these affections only but in every variety of phlegmasia.

Amaurosis.—Amaurosis is said to have been beneficially treated by emetics, but much reliance obviously cannot be reposed on them, when the retina, or the optic nerve, or the part of the brain in which the optic nerve arises, is affected with paralysis. Impaired or depraved vision often occurs sympathetically from disorder of the digestive functions; at other times, it is owing to a lesion of the eye itself, or of the encephalic part of the organ of vision; hence the affection termed *myodesopsia* or *muscæ volitantes* is symptomatic of one or other of these morbid conditions; and hence the various hallucinations, illusions or waking dreams, which occur in diseases of the encephalon,—as mania and hypochondriasis, but which are often produced in persons of sound mind, whose nervous systems are unusually impressible, and easily acted upon by irritations in the stomach, or elsewhere.

Where the primary mischief in such affections is in the stomach or intestines, emetics are more likely to afford relief than when it is seated originally in the encephalon.

Bubo and *orchitis.*—In certain local affections—as *bubo* and *orchitis*—the revellent action of an emetic is often beneficial. The inflammation may have been vigorously attacked by the proper antiphlogistic measures, yet the swelling may remain stationary. If a powerfully revellent nervous impression be now made by exciting emesis, the swelling will frequently disappear.

In the very early stages of orchitis, or bubo, the revulsion, thus induced, is by no means as efficacious. The excited state of vessels generally predominates too much to be broken in upon by any impression upon the nervous system. The state of vessels must be reduced by antiphlogistics, and then emetics may be had recourse to with full advantage.

Phthisis pulmonalis.—In phthisis pulmonalis, emetics were at one time considered the best remedies: and, according to one writer, Dr. Young, a majority of the cures of phthisis have been effected by them or by nauseating agents. This idea probably originated from the good effects observed to follow a sea voyage, which is usually accompanied by sea-sickness; but the fallacy, in this case, consists, in referring that to the nausea, which may have been produced by the greater equability of temperature at sea, and by the new impressions made upon the mind and nervous system of the voyager, through the altered barometrical, hygrometrical, thermometrical, electrical, and other conditions of the atmosphere, and by the new scenes in which the patient was placed. Even in the early stages of phthisis, when alone any course of medication can be expected to be effective, emetics are, at the present day, rarely had recourse to. In the later periods of the disease, they are not only useless, but add to the existing irritation and debility.

Diseases of the alimentary canal.—In gastritis, and enteritis, emetics are manifestly not needed, and would probably be injurious; nor would they appear to be indicated in *spontaneous vomiting;* but as diarrhœa is often kept up by irritants in the intestinal canal, and requires the administration of a cathartic to remove them, so vomiting may suggest the use of an emetic; and even when spontaneous vomiting has persisted after the contents of the stomach have been evacuated, the new action induced by an emetic may break in upon the disorder of function, and remedy the evil.

In *dyspepsia,* emetics are occasionally prescribed, but they must be employed with caution. A gentle emetic removes indigestible matters and morbid secretions, and produces an excitation in the stomach which may be salutary; but repeated emetics, as has been previously shown, may injure the tone of the organ, develope its sensibility, and augment the very affection for the removal of which they were administered.

In *cholera*—both of the indigenous, and exotic variety—gentle emetics are prescribed by some practitioners, and as means for the removal of morbid secretions they may be useful; but it is not clear, that they ought to be regarded as of much efficacy in affections that are dependent upon an irritated or excited state of the gastro-enteric mucous membrane, and which yield with the subsidence of the inflammatory irritation,—or terminate unfavorably, when the morbid affection of the membrane in general, and of the exhalants in particular, is excessive.

In cases of *malignant cholera*, the stimulating emetics—as mustard—have been most frequently employed,—the erethism of the mucous membrane in these malignant cases being occasionally diminished by gentle excitants, as we have seen it may be in affections of the mucous membranes in general, when the over-distended state of extreme vessels is the prominent pathological lesion. A main part of the benefit, however, accruing in such cases, may be derived from their revulsive operation,—the chief pathological mischief being usually situate lower down in the tube. It has, indeed, been a question, with some therapeutists, whether advantage might not be derived, in these unfortunate cases, from remedies that might even inflame the lining membrane of the stomach; but such a harsh plan of revellent treatment could, of course, be scarcely admissible.

In *diarrhœa* and *dysentery*, where the irritation is seated low down in the tube, an emetic may produce good effects as a revulsive; but, in the latter disease, the violence of the inflammation must be previously subdued by appropriate agents. It would seem, too, that in certain cases of *constipation*, accompanied with spasmodic constriction of the muscular coat of the intestines, emetics, administered after blood-letting, have relaxed the spasm, so that the bowels have been relieved, or gentle cathartics have afterwards been sufficient.

In dysentery, the seat of which is chiefly in the lining membrane of the large intestine, the revellent and equalizing effects of emetics are beneficially manifested.

Rheumatism and gout.—In acute rheumatism and gout, emetics are not much used, although occasionally their operation—as revellents and equalizers—may be advantageously exerted. In the latter disease, connected as it is with considerable gastric disorder, their use might seem to be more especially indicated; and in both diseases they may be demanded for the removal of morbid secretions, or of undigested matters from the tube,—a result, which can generally, however, be accomplished by the use of gentle cathartics.

Hemorrhages.—After what has been said of the general mode of action of emetics, and of their application to the ordinary phlegmasiæ, their agency in hemorrhages will be apparent. In *epistaxis*, they cannot be required, and their employment in *apoplexy*,—it has been already seen,—is a more than questionable measure. The same, it has been thought, may be said of *hæmoptysis*. Although their equalizing and revulsive operation might act favorably, it has been conceived, that the activity they occasion in the vascular movements might more than compensate for their salutary agency. Yet, it has not been found, that hæmoptysis, symptomatic of phthisis, has recurred, or been increased at sea during the retching of sea-sickness. In such cases, nauseating doses are recommended, which, as before shown, produce an effect of a directly opposite character, so as to give occasion to their being classed amongst agents that diminish action.

In *hæmatemesis*, emetics have been recommended by some, with the view of removing the accumulations of blood that form in the stomach; and in this respect, they may be of service. The hemorrhage, in these cases, is generally venous, and seems to take place by diapedesis or transudation,—often owing to visceral engorgement, which prevents the blood from circulating freely in the engorged organ, and occasions irregular congestions in other parts. In such cases, emetics ought to be administered with caution. In the wards of the Philadelphia Almshouse, the author annually met with cases of hæmatemesis, melæna, and epistaxis, occasioned by engorgement and induration of the liver or spleen—especially of the latter—acquired in malarious districts.

The proper treatment of the hemorrhage necessarily merges in that of the primary affection on which it is dependent.

In cases of simple hæmatemesis, the action of the stomach, induced by an emetic, may occasion the removal of the venous congestion, and the pressure of the muscular coat of the viscus on the vessels exhaling the blood may tend to contract their dimensions, and to arrest the flow, somewhat, perhaps, in the manner that the hemorrhage is arrested in the next variety to be considered.

Uterine hemorrhage may occur prior to, during, and subsequent to the delivery of the child. In all cases, it is produced by a discharge from the uterine vessels. The old idea, universally entertained, was, —that the vessels of the mother pass directly to the placenta, and pour their blood into the maternal portion of that organ. Under this view of the subject, which modern researches prove to be the most correct, hemorrhage would be produced by a rupture of the maternal vessels. Some observers have satisfied themselves, that there is no direct communication between the uterine vessels and the placenta, but that these vessels coast along the uterine parietes in a direction parallel to the placenta,—having, however, portions scooped out of their sides, which portions are closed, either directly or indirectly, by the placenta. Under this view, there can of course be no maternal and fœtal portions of the placenta; the whole is fœtal, and hemorrhage arises from the detachment of the decidua or of the placenta from the apertures in the uterine vessels. Under either view, whatever induces contraction of the uterus, occasions the reapplication of the placenta, or of the body of the child to the vessels whence the hemorrhage proceeds, and arrests it. These remarks apply, of course, only to hemorrhage occurring prior to, or during delivery, and then only to cases in which the placenta is situate elsewhere than over the os uteri.

In uterine hemorrhage following the delivery of the ovum, the hemorrhage is arrested by causing the uterus to contract upon itself, and thus to obliterate, as it were, the maternal vessels; and emetics, which call into action the abdominal muscles, facilitate this result, although they are but rarely had recourse to, seeing that the obstetrical practitioner has more immediate and effectual means for attaining his object.

Jaundice.—In jaundice, dependent—as it often is—on some impediment to the flow of bile along the biliary ducts into the duodenum, and especially when produced by a gallstone, the inverted action and the succussion, induced by the operation of an emetic, are often beneficial; and the same remark holds good in cases of *cholelithus* or *gall-stone* without jaundice. Here, an emetic should be selected, whose operation is preceded by nausea—as tartrate of antimony and potassa, or ipecacuanha—the relaxing influence of which is first felt, and immediately afterwards the propulsory efforts follow, which are, at times, successful in causing the calculus to clear the biliary passages. It has been properly remarked, however, that emetics are more advantageous and safe in the early than in the latter periods of jaundice when there is reason to believe in the existence of organic disease of the liver; and, also, that they should be used with caution, when there is evidence of distension of the gall-bladder;—indicated by a tumor felt on pressing the right hypochondrium. Under such circumstances, the operation of an emetic has been known to occasion rupture of the gall-bladder and fatal peritonitis.

Neuroses.—In *mental alienation*, emetics were at one time much advised, and some of the most noted remedies possessed properties of this kind. They are not given at the present day, unless symptoms should arise in the course of the disease to indicate their administration. In the cases, in which they are presumed to have exerted a salutary influence, this was probably accomplished less by their acting as evacuants, or through modifications induced in the circulation, than by the new impression made by them upon the nervous system. Hence, they are occasionally used in mania to interrupt intense abstractions. When the insane obstinately determine to retain the urine and fæces, an emetic often succeeds in breaking in upon the determination; and the same applies to those who are affected with *delirium tremens*, in which disease emetics have been wholly relied on by some. (For the author's views on this subject, see his *Practice of Medicine*, 3d ed. ii, 248, Philadelphia, 1848.) In all such cases, emetics have to be given in larger doses than usual. The encephalon being in a state of excitement, and employed in its own acts, is less affected by impressions made on other organs; and, consequently, requires a larger amount of the impressing agent; but if the energy of the system be first reduced by a copious abstraction of blood, the ordinary dose of the emetic may produce its accustomed effects.

In *hypochondriasis*, which is an encephalic disorder, accompanied generally with much gastric derangement, an occasional emetic is often beneficial, by exciting a new action in the nervous system, and giving an impulse to functions carried on with unwonted torpor.

In *epilepsy*, and in the *convulsions of children*, emetics are not only excellent prophylactics, but valuable curative agents. Where organic mischief does not exist, these diseases are usually induced by great mobility, or impressibility of the encephalon, developed by irritation in some distant part of the system, and especially in the digestive tube. Often, this is produced by indigestible diet, or by morbid secretions, and when the prodromic or premonitory symptoms of the attack are present, a timely emetic may prevent the paroxysm, by removing the cause, and exciting a new nervous impression, as in the case of intermittents.

The same kind of revulsion is, at times, salutary in *hysteria*, as well as in the different forms of *neuralgia*. The impression of the emetic is powerfully exerted on the stomach, whence it irradiates to every part of the nervous system; and, by equalizing the nervous distribution or influx, detracts from its intensity in any given point.

Dropsy.—Lastly;—emetics have been frequently exhibited in the different varieties of dropsy;—and in such cases they are calculated to act as promoters of absorption;—not so much in consequence of any increased action of the exhalants of the lining membrane of the stomach, which they may occasion, as by their revulsive operation. Dropsies, as will be seen, have been known to disappear under powerful mental emotions, and not only dropsies, but depositions of solid materials; and we can, therefore, understand, that these affections may diminish under the nervous derivation excited by an emetic. They cannot, however, be repeated sufficiently often to produce much salutary influence, for fear of injuring the tone of the stomach; and, accordingly, they are but rarely employed in the treatment of hydropical affections.

Such are the main diseased conditions in which emetics are especially serviceable. It is obviously impossible to specify every variety of organic lesion in which they may be salutary. Enough has been said of their general properties, and particular applications, to suggest the cases in which their administration may be indicated.

SPECIAL EMETICS.

a. Direct Emetics.

1. ZINCI SULPHAS.—SULPHATE OF ZINC.

Sulphate of zinc occurs in commerce in an impure state under the name of *White Vitriol;* by which, indeed, it was long known in medicine. The salt, however, always contains iron, and commonly copper and lead; and therefore, for pharmaceutical purposes, it is directed to be prepared by the union of oxide of zinc and sulphuric acid. It is in colorless crystals, which effloresce on exposure to the air. It is wholly dissolved by water, by $2\frac{28}{100}$ of its weight of cold water, and by less than its own weight of boiling water. It is insoluble in alcohol. The solution in water affords with ammonia a white precipitate, which is redissolved by the alkali in excess. It also yields white precipitates with chloride of barium, ferrocyanuret of potassium, and sulphohydrate of ammonia.

It enters into the preparation of *Zinci Carbonas Præcipitatus* of the Pharmacopœia of the United States.

Sulphate of zinc, which is tonic in small doses, is a rapid and safe emetic; and hence is given, when it is desirable to evacuate the contents of the stomach speedily, as when poison has been taken. The dose for this purpose is from ten to thirty grains. In excessive doses it acts as an irritant poison.

2. CUPRI SULPHAS.—SULPHATE OF COPPER.

The Sulphate of Copper, *Roman* or *Blue Vitriol*, *Blue stone*, used in the United States, is formed by a direct combination between old scrap copper and sulphuric acid. This is always made on a large scale; and hence it is not in the list of preparations of the Pharmacopœia of the United States, but in that of the Materia Medica. It occurs in rich blue crystals, which are wholly soluble in water, and slightly efflorescent in the air. It is insoluble in alcohol. Ammonia throws down, from a solution of the salt in water, a precipitate, which is entirely redissolved when the ammonia is added in excess. It dissolves in about four parts of water at 60°, and two parts of boiling water.

It enters into the preparation of *Cuprum Ammoniatum* of the Pharmacopœia of the United States.

Like sulphate of zinc, sulphate of copper is, in very small doses, tonic; and in larger, emetic. It is, however, much more active, and in considerable doses is a highly acrid and corrosive poison. Its dose, as an emetic, is from two to five grains, given in water; but it is less safe than the sulphate of zinc.

3. ALU′MEN.—ALUM.

This salt—the main properties of which are described under the head of MINERAL ASTRINGENTS—has been much employed by Dr. Meigs, of Philadelphia, and by his son, Dr. J. F. Meigs, as an emetic in croup. The former states, that he has been familiar with its effects for more than twenty years, and that his confidence in it, as a certain and speedy emetic in such cases, increases rather than diminishes by time. He has never, he thinks, given more than two doses without causing very full vomiting; but has often given large quantities of antimony, antimonial wine and ipecacuanha without their occasioning the desired effect. It has the advantage, also, of operating without occasioning more exhaustion or prostration than always follows the act of vomiting.

It is best prescribed in powder, mixed with honey, syrup of any kind or molasses. The dose is a teaspoonful, mixed with an equal or double the quantity of the vehicle, and repeated in ten, fifteen, or twenty minutes, should the first dose fail to produce free vomiting. It is seldom necessary to give a second dose.

4. HYDRAR′GYRI SULPHAS FLAVUS.—YELLOW SULPHATE OF MER′CURY.

This salt of mercury, called also *Subsulphate of Mercury* and *Turpeth Mineral*, is obtained by throwing a sulphate of mercury into boiling water. It is a lemon-yellow powder, almost insoluble in water; dissolving in about 2000 parts of cold water, and in about 600 parts of boiling water.

It is in large doses a violent corrosive poison. It is occasionally, but rarely, given as an emetic; its operation having been regarded as very severe, and at times followed by ptyalism. Dr. Hubbard, of

Maine, has been, however, in the habit of employing it largely, in cases of croup, and recommends it strongly on the ground of its promptness of action. It does not produce catharsis, nor is its action followed by the prostration, which, at times, follows that of tartrate of antimony and potassa.

The dose, as an emetic, is from two to five grains. Dr. Hubbard prescribes from two to three grains to a child two years old, and repeats the dose in ten or fifteen minutes until emesis is induced.

b. Indirect Emetics.

5. ANTIMO′NII ET POTAS′SÆ TARTRAS.—TARTRATE OF ANT′IMONY AND POTAS′SA.

Tartrate of Antimony and Potassa, *Tartarized Antimony*, *Emetic Tartar*, *Tartar Emetic*—in the Southern States of the Union erroneously termed *Tartar*—is, perhaps, more frequently used as an emetic than any other agent.

In the Pharmacopœia of the United States it is directed to be formed as follows:—Take of *Sulphuret of Antimony*, in fine powder, ℥iv; *Muriatic Acid*, ℥xxv; *Nitric Acid*, ʒij; *Water*, a gallon. To the acids mixed in a glass vessel, add gradually the sulphuret of antimony, and digest the mixture with a gradually increasing heat till effervescence ceases; then boil for an hour. Filter the liquor when it has become cool, and pour it into the water. Wash the precipitated powder frequently with water, till it is wholly freed from acid, and then dry it. Take of this powder, ℥ij; *Bitartrate of Potassa*, in very fine powder, ℥iiss; *Distilled Water*, f℥xviij. Boil the water in a glass vessel; add the powders previously mixed together, and boil for an hour; filter the liquor whilst hot, and set it aside to crystallize. By further evaporation, the liquor may be made to yield an additional quantity of crystals, which should be purified by a second crystallization.

Tartrate of antimony and potassa consists of tartrate of antimony and tartrate of potassa; and the object of the above process is first to form sesquioxide of antimony, and then to saturate with it the excess of acid in the bitartrate of potassa. It is in transparent crystals, which become opaque and white on exposure to the air. As met with in the shops, it is generally in powder, and, when pure, is perfectly white. Dr. Pereira, however, remarks, that some ignorant druggists prefer a yellowish-white powder; and he was informed by a manufacturer of the salt, that he was obliged to keep two varieties,—one white, the other yellowish-white,—to meet the demands of his customers. The yellow hue is owing to the presence of iron.

It is often adulterated with bitartrate of potassa; and it has been found that it may contain 10 per cent. of it, and yet dissolve in the proper quantity of water. It is wholly soluble in 14 or 15 parts of water, according to Dr. Pereira;—according to the Pharmacopœia of the United States, in 20, at 60° Fahr. Uncombined bitartrate of potassa is detected by adding a few drops of a solution of carbonate of soda to a boiling solution of the antimonial salt. This causes a precipitate, which is immediately redissolved, if bitartrate of potassa be present.

When tartrate of antimony and potassa is taken in very large doses, it acts as a powerful irritant poison, causing directly inflammation of the stomach and intestines. It is likewise an irritant when applied to the cutaneous surface. It may well be questioned, however, whether, when taken internally, it acts in its undecomposed state. All antimonials, according to M. Miahle, become converted in the stomach, owing to the presence of free hydrochloric acid, and the alkaline chlorides, in the gastric secretions, into a highly irritating compound—the chlorohydrate of chloride of antimony; and he asserts, that all the preparations of antimony, which either contain the hydrated oxide of the metal, or readily give rise to the formation of this compound, are very energetic agents. Hence, tartrate of antimony and potassa, metallic antimony, and the oxides of the metal that have been prepared in the moist way, are readily acted upon by the gastro-enteric fluids, and produce the soluble chlorohydrate of the chloride; whilst the preparations of the metal that have been prepared by a dry process, as Pulvis antimonialis and certain forms of Kermes, are not so soluble in the gastric secretions, and their effects are milder and more uncertain. In this way, M. Mialhe accounts for an anomaly mentioned by M. Trousseau, who, after remarking, that the irritating local action of antimonials is in a direct ratio with their solubility, adds, that he has not been a little astonished, in the course of his experiments, to find that metallic antimony, perfectly pure, and in fine powder, had nearly as energetic an action as tartar emetic; for, admitting that it becomes quickly oxidized in the alimentary canal, and enters into combination as a salt, he cannot conceive how the oxides of antimony, ready prepared, have an action so different from that of the metal. This anomaly is readily accounted for by M. Mialhe, who shows by experiment, that metallic antimony is rapidly acted on by the air, and the gastric acids, whilst the artificial oxides do not as readily enter into combination. No chemical observations have been made upon the blood of those who have been long under the use of antimonials; but Dr. Pereira thinks, that the effects may be inferred from analogy, and be similar to those caused by mercurials. It would be safer, however, for us to confess our want of information on this matter.

The nauseant and emetic properties of tartrate of antimony and potassa alone fall under consideration in this place. As a nauseant, it is constantly given in febrile and inflammatory affections, in such doses as to keep up the action of sedation sufficiently long to break in upon the chain of morbid associations. For this purpose, it is prescribed in the dose from ⅛ to ½ a grain every two or three hours; carefully regulating the quantity, and the periods, so as to prevent the supervention of vomiting. As an emetic, it may be given alone, or in union with ipecacuanha,—one or two grains of the tartrate to fifteen or twenty grains of the latter. When administered alone, it should be in divided doses;—six grains, for example, being dissolved in four ounces of water, and a fourth part given every fifteen minutes until it operates;—the action, in this case, as in that of every other emetic, where it is desirable to evacuate the contents of the stomach freely, and there is no danger of dissolving any noxious matter that may be contained in it, being aided by drinking freely of warm water, or of warm chamomile tea. For reasons, already assigned, it is rarely prescribed, however, where any poisonous agent has been taken,—recourse being then had to direct emetics. Being devoid of taste, it is a very convenient emetic in the diseases of infancy, in which it is advisable to give it in divided doses until vomiting is induced; and it is doubtless the main agent in some of the nauseating and emetic preparations so commonly used in such cases in domestic practice. It has been already remarked, that some caution is needed in its administration to young subjects. Professor Hamilton, of Edinburgh, from the observation of one or two cases in which its operation was attended with unpleasant gastro-enteric disturbance, was disposed to consider, that it is apt to act as an irritant poison when the stomach is empty; whilst it may be innoxious if the child has sucked, or drunk some fluid previously. This is an antagonism with the view of M. Mialhe, who affirms, contrary—the author thinks—to his experience, that it is known that the stomach is better able to bear the action of tartar emetic when it is empty than when full; and this because there is less gastric acid present, and therefore less of the salt converted into the acid chloride. Professor J. B. Beck, of New York, considers, that "where the object is simply to evacuate the stomach, it ought never to be thought of; and that it should not be prescribed except in cases where, as in croup and pneumonic inflammation, a sedative effect is required, and can be borne with safety." And he adds:— "It is perhaps hardly necessary to say, that if Tartar Emetic be an article of such danger, the younger the subject to whom it is given, the more likely is it to do harm. In children under a year, I should say, as a general rule, it ought never to be used. During that period, the powers of life are too feeble to bear so active a remedy, at the same time that all the beneficial effects of an emetic may be gained from the use of ipecacuanha, or even milder means."

The author has never seen the inconveniences depicted by Dr. Beck and others, and he is of opinion, that they will rarely or never supervene if fluid be allowed freely during the emetic action of the antimonial.

VINUM ANTIMO'NII, ANTIMO'NIAL WINE.—(*Antim. et Potass. Tartrat.* ℈j: *Vini albi* f℥x.) Each fluidounce of the wine contains two grains of the tartrate.

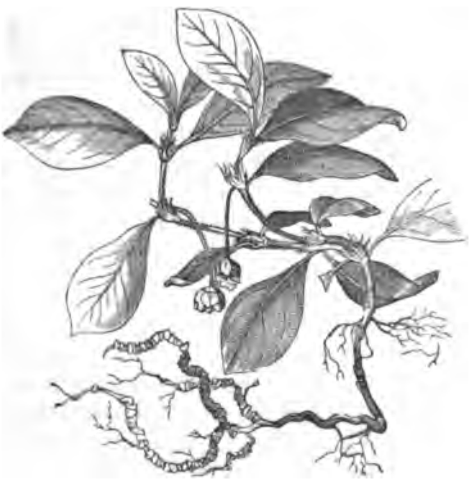
Antimonial wine is commonly kept in families, and it has the advantage, which a watery solution has not, of keeping well. It is readily taken by children for wine. It is not well adapted, however, as an emetic for the adult. If we regard the ordinary dose of the tartrate of antimony and potassa to be two grains, it would require one ounce of the wine, which might, in many diseases, be injurious, and in no circumstances could offer advantages over the aqueous solution. Accordingly, it is rarely prescribed to adults. To children under five years of age, the *vinum antimonii* is generally given in the dose of a teaspoonful, repeated every fifteen or twenty minutes until it acts.

Tartrate of antimony and potassa enters into the composition of *Syrupus Scillæ Compositus* of the Pharmacopœia of the United States.

6. IPECACUAN'HA.

Ipecacuanha is the root of *Cephaëlis Ipecacuanha;* Sex. Syst. Pentandria Monogynia; Nat. Ord. Rubiaceæ,—Cinchonaceæ (Lindley); a small shrubby plant, which grows in Brazil, in moist, shady situations, between the 8th and 20th parallels of south latitude. It is said, also, to occur in New Granada, and in some of the West India islands. The roots are gathered at all seasons of the year, but especially, from January to March inclusive. The amount on which duty was paid in England, in 1841, was 9623 lbs.; but a singular fluctuation as to quantity is presented by the table of imports in successive years, which is as follows: (Pereira.)

Fig. 1.

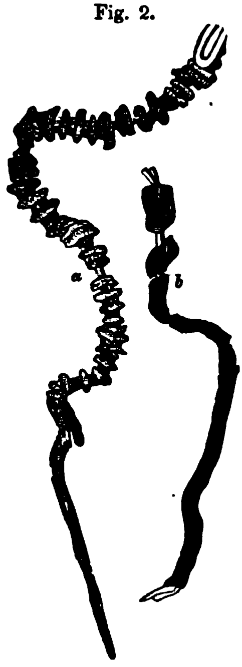


Cephaëlis Ipecacuanha.

In 1834,	9,038 lbs.	In 1838,	12,426 lbs.
1835,	7,469	1839,	7,453
1836,	11,437	1840,	6,483
1837,	11,435	1841,	9,623

As imported, ipecacuanha consists of the proper knotty root, the thinner, woody cylindrical portion by which it is attached to the stem, and frequently a part of the trailing portion of the stem also. The annulated or ringed portion—*Radix Ipecacuanhæ annulatæ fuscæ* of continental writers—is the most active part, and, therefore, ought alone to be used by the apothecary. The root—as we meet with it—is of about the thickness of a small goose-quill, and of a length varying from two inches to seven; contorted, and presenting numerous annular grooves, which give it a characteristic, knotted or ringed appearance. The color varies from brownish, reddish-brown, grayish-brown to gray. Its substance consists of two parts—the one, constituted of the bark; the other, of the meditullium,—the proportion, in 100 parts of good ipecacuanha, being 80 of the former to 20 of the latter. The meditullium is nearly inert, and as it is pulverizable with more difficulty than the cortical portion, when the pulverization is effected in a mortar, it may happen, that the portion which remains last in the mortar, possesses scarcely any medicinal property. Generally, however, at the present day, it is reduced to powder on a large scale by grinding, so that this separation is not observable.

Fig. 2.



Brown Ipecacuanha root.

a. Ringed portion—b. Portion without rings. (Pereira.)

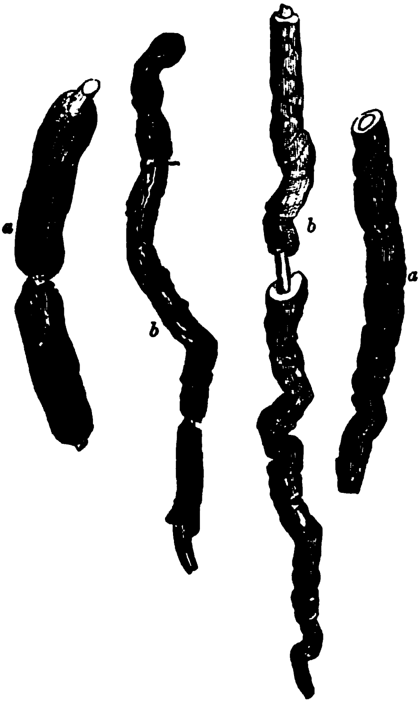
Powder of ipecacuanha has a nauseous odor, and on some persons produces a peculiar effect,—giving rise to sneezing, cough, dyspnœa, and all the symptoms of *catarrhus æstivus* or *hay asthma.* These symptoms pass off after a time, and generally with a copious secretion from the bronchial tubes. It would appear, that small particles of the powder, inhaled with the air, induce bronchitis; and at the same time affect, in a peculiar manner, the ramifications of the pneumogastric nerves, so as to give occasion to this disorder. Two friends of the author suffered excessively whenever they had occasion to handle the powder, and especially if they were present whilst the pulverization was going on. Its taste is bitter, subacrid, mucilaginous, and very nauseous. It yields its virtues to water, and still more to alcohol, pure or diluted. The stronger wines equally extract them, and hence, most of the pharmacopœias have a wine of ipecacuanha. The virtues reside essentially in an active principle, which was first separated by M. Pelletier, in 1817, to which he gave the name *Emetine*—now generally termed *Emetia.* Pelletier's analysis was as follows.

	Brown Annulated Cortex.	Ipecacuanha Meditullium.	Red do. Cortex.
Emetia,	16	1·15	14
Odorous fatty matter,	2	traces	2
Wax,	6	——	—
Gum,	10	5·00	16
Starch,	42	20	18
Ligneous matter,	20	66 60	48
Non-emetic extractive,	—	2·45	—
Loss,	4	4·80	2
	100	100·00	100

The emetia in this analysis is, however, the impure; and it was subsequently found by M. Pelletier, that the root contains only about 1 per cent. of the pure. Such are the characters of the officinal ipecacuanha. Other ipecacuanhas have, however, been described, and it is not surprising, that many roots should have been substituted for the officinal variety. It would appear, however, that they are but little known in the trade of this country, or of Europe. It is, consequently, not necessary to dwell upon them.

Striated ipecacuanha, *black ipecacuanha*, is the root of *psychotria emetica*,—a native of Peru, which was, at one time, supposed to be the source of the true ipecacuanha. This would appear to be sometimes imported into continental Europe, and to be confounded with the dark specimens of the true ipecacuanha. Its joints, however, are longer; and the surface is striated longitudinally. M. Pelletier found it, on analysis, to yield 9 per cent. of an emetic extract similar to impure emetia.

Fig. 3.



Striated Ipecacuanha Root.

a. An old root with a well-marked intersection.
b. Contorted root. (Pereira.)

Undulated Ipecacuanha Root.

a. Root of Richardsonia scabra.
b. Root of a Richardsonia. (Pereira.)

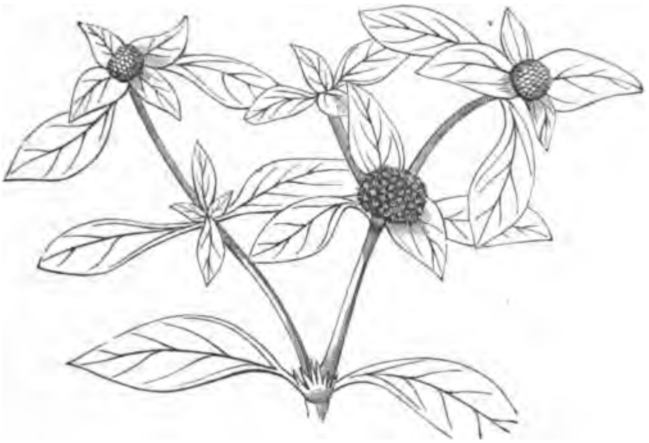
Undulated, *white*, or *amylaceous ipecacuanha* is obtained from different species of *Richardsonia*, which inhabit open plains in Brazil. It resembles the true root, but is distinguished from it by having fewer and shallower annular fissures, larger joints, and by the central woody portion being proportionally much thicker. M. Pelletier found it to contain 5 or 6 per cent. of an emetic extract like impure emetia, and a large quantity of starch.

Another variety of white ipecacuanha is obtained in Brazil from *ionidium ipecacuanha* or *viola ipecacuanha*. It is much thicker than true ipecacuanha, being sometimes as large as the little finger, having only a few transverse fissures, distinct joints or knots, and a thick woody interior. M. Pelletier found this root to contain about 5 per cent. of emetic extract similar to impure emetia.

As an emetic, ipecacuanha acts like tartrate of antimony and potassa. It is perhaps the safest and most certain of the indirect emetics, and although it is supposed to be—in large doses—an acronarcotic poison, the author has never known a case, in which such symptoms have presented themselves. Emetia, however, when injected into the venous system of a dog, excites vomiting in the first instance, and afterwards coma, which ends fatally.

To produce full emesis, ipecacuanha is often associated with tartrate of antimony and potassa, as remarked under that article; but it is frequently given alone. The common mode is to administer about twenty grains of the powder in warm water; and to repeat this quantity every fifteen or twenty minutes until it operates; drinking freely of warm water or of warm chamomile tea. When the object is to excite nausea, from one to three grains may be prescribed at such intervals as may be deemed advisable. This dose will generally be sufficient, as an emetic, for children two or three years old. When it does not act on the stomach, both it and other emetics are apt to affect the bowels; and not unfrequently they all have an emeto-cathartic operation.

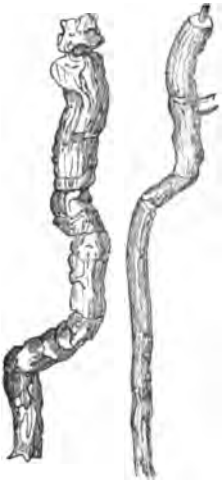
Fig. 4.



Richardsonia scabra.

VINUM IPECACUAN'HÆ, IPECACUANHA WINE.—(*Ipecac.* contus. ℥ij; *Vini albi* Oij.) This preparation may be used in the same cases as antimonial wine, and there may be cases in which it may be proper when the former is not: for example, antimonial wine, in particular persons, produces griping and intestinal irritation, whilst the wine of ipecacuanha does not;—and conversely. It is a very safe emetic for children. The dose to the adult is one fluid ounce; to the child of from one to two years of age a teaspoonful or one fluidrachm.

Fig. 5.



Ionidium Ipecacuanha Root. (Pereira.)

SYR'UPUS IPECACUAN'HÆ, SYRUP OF IPECACUANHA.—(*Ipecac.* in pulv. crass. ℥j; *Alcohol. dilut.* Oj; *Syrup.* Oij. Prepared either by maceration or by the process of displacement.) From f℥j to f℥ij of this preparation will act as an emetic, but it is not much used. It is more convenient for children, on whom it operates in the dose of from fʒj to fʒij.

EMET′IA.

Emetia, *Emetina*, *Emeta*, is—as already remarked—the active principle of Ipecacuanha, which was first separated from it in 1817 by M. Pelletier, of Paris. It is not officinal in the Pharmacopœias of Great Britain, or in that of the United States, but has been received into many continental Pharmacopœias,—as the Parisian, Batavian, Hanoverian, &c. There are two varieties of the active principle, which, according to Magendie, bear the same relation to each other as moist sugar does to the crystallized. One of these is termed *impure*, the other *pure*. To obtain the former, powdered ipecacuanha is digested with ether to dissolve the fatty matter, whence it derives its disagreeable odor, and which possesses no emetic virtue. When the powder yields nothing more to the ether, it is exhausted by means of alcohol; the alcohol is then evaporated in a water-bath, and the residue dissolved in cold water. It thus loses some of the wax, and a little of the fatty matter that still adhered to it. It is then mixed with carbonate of magnesia, whereby it loses its gallic acid, is redissolved in alcohol, and evaporated to dryness.

To obtain pure emetia, magnesia is substituted for the carbonate used in the process just described, in such quantity, that the acid existing in the liquid may be neutralized, and that which is associated with the emetia be separated from it. The precipitate of magnesia and emetia must now be washed with cold water to remove the coloring matter, which is not combined with the magnesia; and after being carefully dried it must be treated with alcohol, which dissolves the emetia. The emetia obtained by the evaporation of the alcohol must then be dissolved in a dilute acid, and treated with pure animal charcoal. After this purification it must be precipitated by a salifiable base.

Impure emetia is in the form of reddish-brown, transparent scales, which are almost inodorous, and of a bitter taste. It is very deliquescent, and soluble in water. Pure emetia has a white, and frequently somewhat yellowish, appearance, is pulverulent, and does not deliquesce like the impure. It is but little soluble in cold water; more so in warm. It dissolves readily in ether and alcohol. With acids it forms crystallizable compounds, from which it may be precipitated by galls, which are the best agents for obviating its effects in an overdose.

Emetia—the impure especially—has been proposed as a substitute for ipecacuanha, and with this view formulæ for officinal preparations of it have been received into many of the Pharmacopœias of continental Europe. It would not seem, however, that much advantage would result from its use, and it certainly is far more expensive than ipecacuanha in any of its forms of preparation. The dose of impure emetia is a grain, or a grain and a half, given at intervals of fifteen or twenty minutes until it vomits; of pure emetia, from a quarter to half a grain.

7. GILLE′NIA.

Gillenia is the root of *Gillenia trifoliata*, *Spiræa trifoliata*, *Indian*

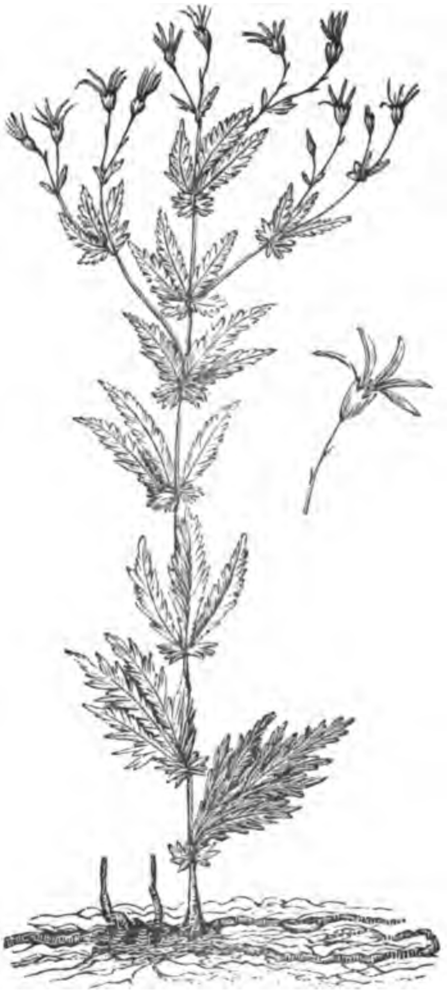
Physic, *American Ipecacuanha*, *Beaumont Root;* SEX. SYST. Icosandria Pentagynia; NAT. ORD. Rosaceæ;—an indigenous herbaceous plant, which grows throughout the United States, to the east of the Alleghanies, from Florida to Canada, in light soils and in shady and moist situations; and flowers in June and July. The root is gathered in September.

Gillenia stipulacea grows in the valley of the Mississippi. Its root is like that of the eastern species, and is said to possess the same properties.

As met with in the shops, the root of Gillenia is of the size of a small goose-quill, wrinkled longitudinally, with occasional transverse fissures, and, in the thicker pieces, having a somewhat knotty appearance, owing to indentations on one side corresponding with prominences on the other. The chief properties are in the cortical portion, which has a bitter disagreeable taste. Its virtues are extracted by the same menstrua as ipecacuanha.

As one of its names imports, its medical virtues resemble those of ipecacuanha, for which it is substituted by some. It is not, however, much used, although said to be a mild and satisfactory emetic. The dose of the powder is from 20 to 30 grains, repeated, like ipecacuanha, at intervals of 15 or 20 minutes until it operates.

Fig. 6.



Gillenia stipulacea.

8. SCILLA.—SQUILL.

Squill is the bulb of *Scilla* seu *Squilla* seu *Urginea maritima*, *Sea onion;* SEX. SYST. Hexandria Monogynia; NAT. ORD. Liliaceæ; which grows on the shores of the Mediterranean—viz. Spain, France, Italy, Sicily, Greece, and Africa. It is imported, both in the fresh and dried state, but much more commonly in the latter; owing, perhaps to the fact, that in England, and we believe in this country also, the duty on the dried bulb is no higher than on the fresh.

The fresh bulb is pear-shaped, and consists of concentric lamellæ, the outer ones of which are thin, membranous, and of a brownish-red color, whilst those within are whitish, thick, fleshy, and juicy.

In English pharmacy, two kinds of squill are met with,—the *white* and the *red*, the former of which is preferred. The average weight of the bulb is from half a pound to four pounds, but it has been seen weighing ten pounds and a half. The fresh bulb is kept in dry sand; and before drying it the dry rind is removed; after which the bulb is cut transversely into thin slices, and dried as quickly as possible with a gentle heat.

Dried squill of the shops is in yellowish-white, or white, slightly diaphanous pieces, which are brittle when dry, but generally flexible, owing to their high hygrometric property; on which account, it ought to be kept in a dry place, or in well-stopped bottles. It is inodorous; and of a bitter, nauseous, extremely acrid taste. It yields its virtues to water, alcohol, and vinegar. Its best solvents are dilute alcohol and vinegar, which are, consequently, used in various officinal formulæ.

Squill has been subjected to analysis by different chemists; but the results have not been satisfactory, and it is not admitted that the active principle has been isolated.

In large doses, squill belongs to the acro-narcotic class of vegetable poisons. When given to a less extent, it operates as an emetic, generally producing catharsis also. As an emetic, it is rarely prescribed, except in affections of the respiratory organs; over which—as will be shown under the head of Expectorants—it is conceived to exert some special agency. Is is rarely, however, given, except in croup, to such an extent as to produce emesis, as it is exceedingly uncertain in its action, and the vomiting induced by it is, at times, of the most harsh and disagreeable kind.

The dose of powdered squill, as an emetic, is from six to twelve grains; but it is scarcely ever prescribed in this form to the adult; and to children one of the following preparations is selected. If it be desirable to nauseate by the powder, one or two grains may be given three or four times a day, gradually increasing the dose until the effect is induced.

TINCTU'RA SCILLÆ, TINCTURE OF SQUILL.—(*Scill.* ℥iv; *Alcohol. dilut.* Oij. Prepared either by maceration, or by the process of displacement.) As a nauseant, this tincture may be given in the dose of 30 to 40 drops, two or three times a day. It is rarely, however, prescribed with this view, being generally added to expectorant mixtures. It is not administered as an emetic.

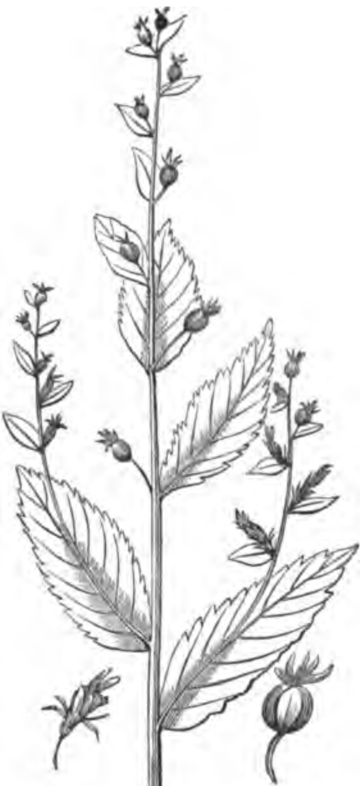
ACE'TUM SCILLÆ, VIN'EGAR OF SQUILL.—(*Scill.* cont. ℥iv; *Acet. distillat.* Oij; *Alcohol* f℥j. Prepared either by maceration or by the process of displacement.) Two fluidrachms will usually induce nausea. The alcohol is added to prevent decomposition.

OX'YMEL SCILLÆ, OXYMEL OF SQUILL.—(*Mel. despumat.* ℔iij; *Acet. Scillæ* Oij. Reduce to the specific gravity 1·32.) This preparation is occasionally prescribed for children laboring under croup or pulmonary catarrh, and repeated so as to induce vomiting. The dose for the purpose is a teaspoonful given every fifteen or twenty minutes.

SYR'UPUS SCILLÆ, SYRUP OF SQUILL.—(*Acet. Scillæ* Oj; *Sacchar.* ℔ij.) Given as a nauseant and emetic in the same cases and doses as the last.

SYR'UPUS SCILLÆ COMPOS'ITUS, COMPOUND SYRUP OF SQUILL.—The *Mel Scillæ Compositum* or *Compound Honey of Squill* of the former Pharmacopœias of the United States. (*Scill.* cont.; *Senegæ* cont. āā ℥iv; *Antimon. et Potass. Tartrat.* gr. xlviij; *Aquæ* Oiv; *Sacchar.* ℔iiiss. The water is poured upon the squill and senega. It is then boiled to one-half, and strained; the sugar is added, and the whole evaporated to three pints. Whilst hot, the tartrate of antimony and potassa is dissolved in it. It may also be prepared by the process of displacement.) This preparation is commonly known under the name of *Hive Syrup;* and as a formula of the kind was originally proposed by Dr. J. R. Coxe, it bears the name of *Coxe's Hive Syrup*. It is much used in domestic practice, and is a favorite remedy for croup and every form of pulmonary catarrh in children. The dose is from ten drops to a fluidrachm, according to the age of the child, repeated every fifteen or twenty minutes until it operates. It is doubtful, however—as elsewhere remarked—whether this syrup have any virtues as an emetic not possessed by tartrate of antimony and potassa, or ipecacuanha; whilst it has the same inconveniences as the former—one grain being contained in an ounce of the syrup. "The Hive Syrup of Dr. Coxe," observes Dr. J. B. Beck—"which is now in every family, and is given on the slightest occasion to infants, without even consulting a physician, has, I am confident, done a great deal of harm. I say this without wishing to undervalue this preparation. In proper cases it is really a useful article, but persons out of the profession ought to know that its principal efficacy is owing to the quantity of tartar-emetic which it contains, and that the indiscriminate use of it in cases where mild articles are required, must be injurious."

Fig. 7.



Lobelia inflata.

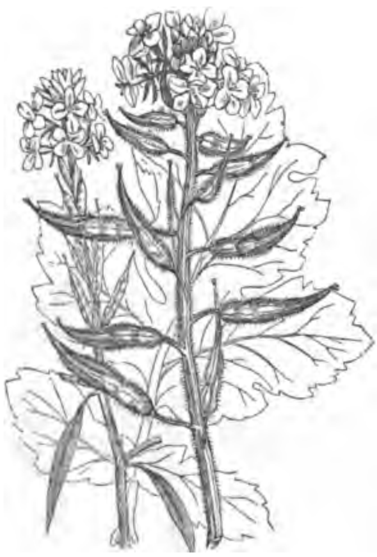
The author has no partiality for it.

9. LOBE'LIA.

Lobelia Inflata, *Indian Tobacco* or *Emetic Weed;* SEX. SYST. Pentandria Monogynia; NAT. ORDER, Lobeliaceæ; is an indigenous plant, which is a common weed throughout the United States, beginning to flower about the end of July, and terminating on the occurrence of frost. The plant is collected in August or September. When chewed, it produces the same effects as tobacco. Like it, too, it appears to contain an essential oil, on which its odor depends; and an acrid or alkaline principle, to which its effects on the system have been ascribed. To this acrid principle, Mr. Procter, of Philadelphia, who separated it, gave the name *Lobelina.* He found that the seeds contained at least twice as much in proportion as the whole plant, which yielded only one part in 500.

Lobelia imparts its virtues to the same menstrua as ipecacuanha. It is a powerful acro-narcotic, and has, therefore, to be administered with caution. On this account it is not often given, in regular practice, as an emetic. The dose of the powder is from five grains to twenty, repeated until it operates.

Fig. 8. Fig. 9.



Sinapis Alba. Sinapis Nigra.

TINCTU'RA LOBE'LIÆ, TINCTURE OF LOBELIA. (*Lobel.* ℥iv; *Alcohol dilut.* Oij; prepared either by maceration, or by the process of displacement.) The full dose of the tincture, as an emetic, is about half a fluidounce; but it is sometimes prescribed as an emetic and narcotic in asthmatic cases, in the dose of f℥j or f℥ij until vomiting is induced.

10. SINA'PIS.—MUSTARD.

Mustard is the seed of *Sinapis nigra*, and *S. alba;* SEX. SYST. Tetradynamia siliquosa: NAT. ORD. Cruciferæ; plants which are indigenous in Europe, but cultivated there as well as in this country, and which flower in June. It is kept in the shops, both in seed, and in fine powder prepared on the large scale for culinary purposes.

Black mustard seeds are small and roundish; of a reddish or blackish-brown color externally, and yellow internally. When entire, they are inodorous; but when bruised, the odor is very pungent; taste bitterish and acrid. The seeds of white mustard are larger, and of a somewhat less pungent taste. Both varieties afford a yellow powder of a somewhat unctuous character. When bruised or powdered they communicate their active properties to water, but only slightly to alcohol.

Both black and white mustard seeds have been repeatedly subjected to chemical analysis, and the results are interesting to the organic chemist, although very little so to the therapeutist. When black mustard seeds are subjected to pressure, about 28 per cent. of fixed oil is obtained, which has a faint smell of mustard, and a mild oily taste, and which has been used as a cathartic and anthelmintic. On distillation with water, a volatile oil is obtained, which is exceedingly acrid, and contains a portion of sulphur. This oil, it appears, does not pre-exist in the seeds, but is produced by the action of water.

White mustard seeds contain more fixed oil than black, but they cannot be made to yield any volatile oil. Their activity appears to be owing to a non-volatile acrid substance, which does not exist ready formed in the seeds, but is readily formed in them under certain conditions. It was affirmed, many years ago, by MM. Trousseau and Blanc, that the irritating property of black mustard is diminished by the addition of vinegar, which is very often used in forming sinapisms; and that a mixture of concentrated acetic acid in certain proportions with black mustard powder is wholly inert, although either one or the other would act as a powerful excitant—if used, the former with water, the latter undiluted. The vinegar and acetic acid, in these cases, have the effect of preventing the development of the acrid volatile oil.

Interesting experiments have been made on this subject by two modern writers on therapeutics and materia medica, MM. Trousseau and Pidoux, who found: *First.* That there was no notable difference between mustard pounded eight days before it was used, and that which had been pounded five months before. *Secondly.* That a sinapism prepared with hot water acts more rapidly than one prepared with cold water; but at the end of a few minutes, this difference no longer exists. *Thirdly.* That mustard, mixed with water, acts with greater energy than that which is mixed with common vinegar, weak acetic acid, and concentrated acetic acid; and that, reciprocally, acetic acid, mixed with mustard, loses its activity. These gentlemen add, that the admixture with vinegar appeared to have no effect on English mustard—a discrepancy which they express themselves unable to explain. It has been suggested, however, by Dr. Pereira, that this may perhaps be referable to the fact, that common English flour of mustard contains pod pepper, the active principle of which (*capsicin*) is soluble in vinegar. It does not appear that the same deteriorating influences are exerted on white mustard.

The medicinal properties of mustard are those of an acrid excitant. When it meets with water—as already remarked—volatile oil is developed, which is the occasion of the acrid vapor, that arises when flour of mustard and hot water are mixed together.

Mustard seeds bruised, or the powder, in the dose of a large tea spoonful, will generally operate as an emetic, and have been esteemed useful, where it has been considered advisable to rouse the sensibility of the stomach,—as when narcotic poisons have been taken, in malignant cholera, and in certain forms of paralysis. The powder is more frequently, however, diffused in warm water, and administered to aid the operation of other emetics.

Mustard seeds enter into the composition of *Infusum Armoraciæ* of the Pharmacopœia of the United States.

11. TAB′ACUM.—TOBAC′CO.

The leaves of *Nicotiana Tabacum.*—Sex. Syst. Pentandria Monogynia; Nat. Ord. Solaneæ or Solanaceæ—are the officinal portion of the plant, so well known, owing to its extensive cultivation in this country, and to its employment in most parts of the globe. It imparts its properties to both water and alcohol; but long boiling destroys them, and accordingly the extract is devoid of all the virtues of the plant.

Tobacco has been subjected to analysis by many chemists, the result of which would seem to show, that the two main active principles are—a peculiar oily-like alkaloid, called *Nicoti′na*, or *Nico′tia;* and a camphoraceous volatile oil termed *Nico′tianin*, *Concrete volatile oil of tobacco*, and *Tobacco camphor.* Nicotia belongs to the same class of principles as conia, and closely resembles it in chemical properties. It appears to be the most active of the constituents.

When tobacco is distilled at a higher temperature than that of boiling water, an empyreumatic oil is formed, under new combinations, which is virulently poisonous. It is formed in the pipe of the smoker, and is associated with nicotia.

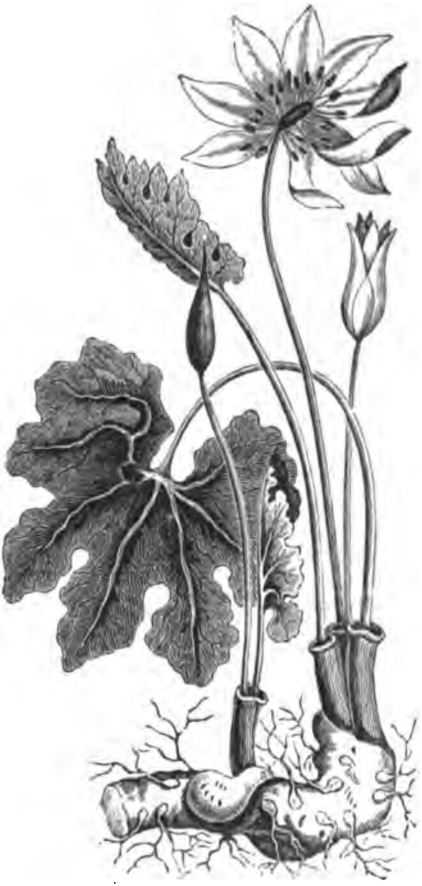
This **O′LEUM TAB′ACI, OIL OF TOBACCO,** has been introduced—it is not easy to see why—into the last edition of the Pharmacopœia of the United States (1851). It is too powerful and unmanageable a poison to be used internally; and has only been employed externally, and that rarely, in the quantity of twenty drops to an ounce of simple ointment or lard, as an application to indolent tumors, ulcers, and cutaneous eruptions. Where the cuticle, however, is removed, it may be absorbed, and give occasion to unpleasant symptoms.

In large doses, tobacco is one of the most violent acro-narcotic poisons. In smaller doses, it occasions vomiting, accompanied by the most deadly sickness and sedation. Hence, its use in cases where great relaxation is necessary. Its powerful nauseant and emetic operation, as well as its effect on the nervous system, is well seen in those who attempt to chew or to smoke it for the first time. Even when given in glyster, or applied to abraded surfaces, it has caused death; and a tobacco cataplasm applied to the pit of the stomach has succeeded in inducing nausea and vomiting, more especially where other emetics have been taken previously. As a nauseant, and therefore relaxant, it has been employed in various forms of colic, constipation, and strangulated hernia; and its operation is generally attended with nausea and giddiness. In these cases, it is thrown into the rectum either in the form of infusion, or of smoke; and in strangulated hernia especially, it has proved effective, after bloodletting, tartrate of antimony and potassa, and other sedative relaxants had been used in vain. In like manner, it has been prescribed in retention of urine, tetanus and other spasmodic diseases,—wherever, in short, it is important to produce powerful sedation, or to relax spasm. Still, the fatal results, occasionally supervening on its employment, must be borne in mind, and it must not be used except in cases which have resisted other means. This is probably the cause, why both the physician and the surgeon prescribe it rarely.

Tobacco has been given as an emetic, in the form of snuff,—five or six grains constituting a sufficient dose; but it is rarely prescribed in this shape.

INFU'SUM TAB'ACI, INFUSION OF TOBACCO.—(*Tabac.* ʒj; *Aquæ bullient.* Oj.) This is never used except as an enema to produce relaxation. It is safer to inject only one half; and if the relaxant effects be not induced in half an hour, to throw up the remainder. It must be borne in mind, that a smaller quantity than half a drachm has proved fatal.

Fig. 10.



Sanguinaria Canadensis.

VINUM TAB'ACI, WINE OF TOBACCO.—(*Tabac.* concis. ℥j; *Vini albi* Oj.) This preparation has been more frequently employed as a diuretic, but it is capable, in repeated doses of thirty or forty drops each, of inducing nausea. A cataplasm is sometimes made of common snuff and cerate, which has been applied to the throat and breast in cases of croup; and Dr. Wood states, that one of the worst cases of spasm of the rima glottidis which he had seen, and which had resisted powerful depletion by the lancet, yielded to the application of a tobacco cataplasm to the throat.

The infusion of tobacco has, likewise, been employed with advantage, as a bath, in tetanic and similar neuropathic affections;—and the cigar has been used, with advantage, in the same cases, by those who have been unaccustomed to it.

12. SANGUINA'RIA.—BLOODROOT.

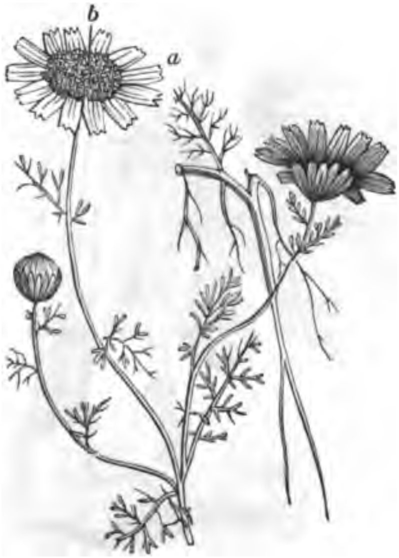
Sanguinaria is the root of *Sanguinaria Canadensis, Bloodroot, Puccoon, Indian Paint, Turmeric;* SEX. SYST. Polyandria Monogynia; NAT. ORD. Papaveraceæ; an herbaceous perennial plant, which flowers early in spring, and grows abundantly in every part of the United States. The root, which is the only officinal portion, when dried, is in flattened pieces, much wrinkled and contorted. The fracture is spongy and uneven,—its surface being at first bright orange, but becoming, by exposure, of a dull brown color. It has a bitterish acrid taste, and imparts its virtues to water and alcohol. An active principle—*Sanguinarine*—has been obtained from it, which is alkaline, and considered to possess all the virtues of the root.

It is said to lose its virtues rapidly by keeping.

Bloodroot is an acrid emetic; and, in large doses, belongs to the class of acro-narcotic poisons. It is not often employed as an emetic. The dose of the powder, with this view, is from ten to twenty grains. It is recommended, that it should be taken in pill, in consequence of the great irritation of the throat produced by the powder when swallowed. (Wood and Bache.) It may also be prescribed in infusion (*Sanguinariæ* ℥ss; *Aq. fervent.* Oj); of which the dose may be a table-spoonful or two.

TINCTU'RA SANGUINA'RIÆ, TINCTURE OF BLOODROOT.—(*Sanguinar.* cont. ℥iv; *Alcohol. dilut.* Oij. Prepared by maceration, or by the process of displacement.) The dose, as an emetic, is f ʒiij to f ʒiv, but it is not often administered as such.

Fig. 11.



Anthemis Nobilis.

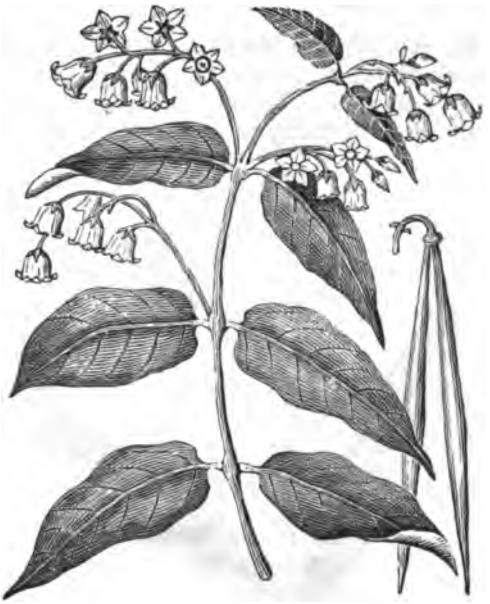
13. AN'THEMIS.—CHAM'OMILE.

Chamomile is the flower of *Anthemis nobilis;* SEX. SYST. Syngenesia Polygamia Superflua; NAT. ORD. Compositæ Corymbiferæ: a plant which is indigenous almost everywhere in temperate Europe. The flowers become double by cultivation; and hence, those which are found in the shops, and which are imported from Germany and England, are of this character. It is cultivated largely around London for the market of that city.

The odor of chamomile is powerful, fragrant, and grateful; and the taste warm and bitter. It imparts its virtues to both water and alcohol, the former of which, at the boiling temperature, extracts nearly one-fourth of its weight. Its most important constituents are,

—volatile oil, bitter extractive and tannic acid; and as the excitant properties are greatly dependent upon the first of these, decoction is an objectionable form, where it is desirable to have a preparation containing all the virtues of the drug.

Fig. 12.



Apocynum Androsæmifolium.

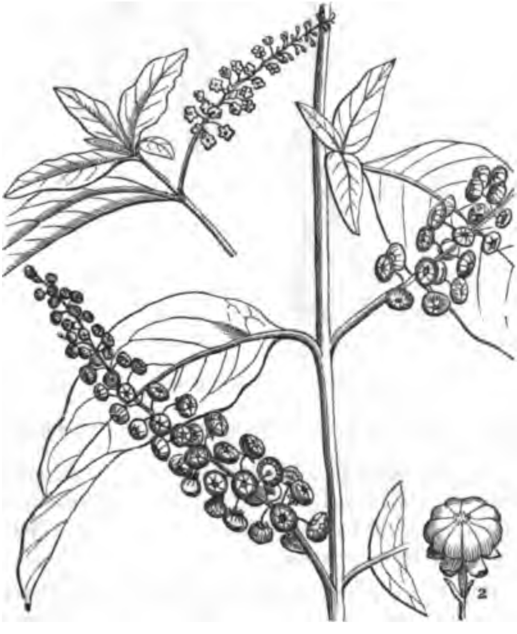
With the view of producing emesis, but one preparation of chamomile is ever given,—the tepid infusion; and it is rarely prescribed, except with the view of aiding the action of other emetics, or in cases where there is a disposition in the stomach to relieve itself spontaneously.

INFUSUM ANTHEM'IDIS, INFUSION OF CHAMOMILE, (*Anthemid.* ℥ss; *Aquæ bullient.* Oj.) Dose, as an emetic, f℥iv. The infusion — *Chamomile tea*—is generally, however, made extemporaneously in domestic practice.

14. SO'DII CHLO'RIDUM.—CHLORIDE OF SODIUM.

When common salt—whose properties are described under CATHARTICS—is taken in the dose of a tablespoonful or more, it excites vomiting; and during the visitations of epidemic cholera, it was preferred by some practitioners to other emetics. It has also been given in cases of narcotic poisoning, where neither the stomach-pump nor an emetic was at hand.

Fig. 13.

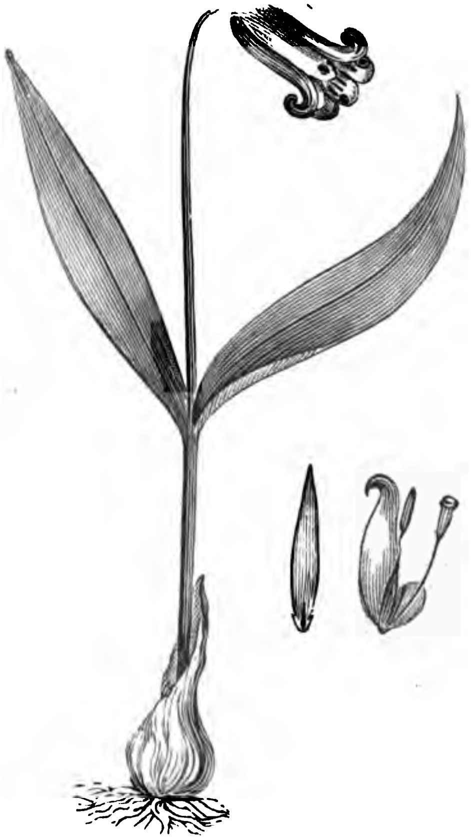


Phytolacca Decandra.

A few other indigenous substances that act as emetics have been admitted into the secondary list of the Pharmacopœia of the United States, viz.:—

15. Apoc''ynum Androsæmifo'lium, *Dogs-bane;* Sex. Syst. Pentandria Digynia; Nat. Ord. Apocynaceæ; a plant which flourishes in every part of the Union, flowering in June and July, and is emetic in the dose of thirty grains of the dried root.

Fig. 14.



Erythronium Americanum.

16. Ascle'pias Incarna'ta, *Flesh-colored Ascle'pias;* Sex. Syst. Pentandria Digynia; Nat. Ord. Asclepiadaceæ; flowering from June to August. The root has been used as an emetic and cathartic.

17. Erythro'nium, *Dog's Tooth Violet;* Sex. Syst. Hexandria Monogynia; Nat. Ord. Liliaceæ; which grows throughout the Northern and Middle States; flowering in April and May; the root and herb being officinal. Dose, as an emetic, twenty or thirty grains of the recent bulb.

18. Euphor'bia Corolla'ta, *Blooming or Large flowering Spurge, Milk Weed;* Sex. Syst. Dodecandria Trigy'nia; Nat. Ord. Euphorbiaceæ; which grows in various parts of the United States, flowering in July and August; the dried root of which is emetic in the dose of from ten to fifteen grains.

19. Euphor'bia Ipecacuan'ha, *Ipecacuanha Spurge, American Ipecacuanha,* which flourishes in the Middle and Southern States, blooming from May to August: the dried root is emetic in the dose of from ten to fifteen grains.

20. Phytolac'cæ Radix, *Poke root*—the root of *Phytolacca Decandra;* Sex. Syst. Decandria Decagynia; Nat. Ord. Phytolaceæ; which is emetic in the dose of from ten to thirty grains; but is slow and

protracted in its operation, is apt to act upon the bowels, and in very large doses to induce symptoms of acro-narcosis. It is not, therefore, often used.

II. CATHAR'TICS.

SYNON. *Dejectoria, Eccathartica, Hypactica, Lapactica, Apocathartica, Coprocritica.*

Definition of cathartics—Effects they are capable of inducing—Organs on which they act—Divided into laxatives and purgatives—Drastics—Abuse of cathartics—Glysters—Suppositories—Therapeutical application—In fevers—In inflammatory disorders—In hemorrhage—In the neuroses—In dropsies, &c. Special cathartics.

The simplest definition of cathartics is—"agents that increase the number of alvine evacuations." Certain writers on Therapeutics have endeavored to incorporate in the definition their *modus operandi;* and, in a modern work, the definition is still farther, and with less propriety, extended, so as to include other effects which they may or may not induce. Thus, the Messrs. Schroff define them to be;—"Medicines, which, by augmenting the secretion and peristole of the intestinal tube, occasion the evacuation by the anus of accumulated and noxious matters:" but it is obviously not necessary for the induction of catharsis, that there should be any accumulation, healthy, morbid, or noxious, in the bowels.

There is no class of medicinal agents possessed of more valuable properties; and none more abused. Exposed, as the digestive organs are, to the most heterogeneous and often irritating substances, and liable to have their tone injured by alternations of stimulation and depression, accumulations of food as well as of secretions are apt to occur, that demand the use of cathartics, the effect of which is not confined to the mucous membrane of the alimentary tube, but through the nerves is propagated elsewhere, so as to react on organs situate at a distance from the seat of the impression.

To fully comprehend the effects that cathartics are capable of inducing, it may be well to consider briefly the organs and tissues on which their operation is immediately exerted.

The mucous coat of the small and large intestines is an extension of that of the stomach, and, with some modification, of that of the supra-diaphragmatic portion of the digestive tube; whilst this, again, may be looked upon as an extension of the general cutaneous envelope. Like the mucous lining of the stomach, that of the small intestines is a part of the surface of relation; and impressions made upon it are probably conveyed, with equal facility, to the great nervous centres. Hence it is, that it has been regarded by M. Broussais as the seat of many important diseases, of a febrile character especially.

In the mucous coat are situate many of those mucous glands or follicles, which, in consequence of their having been described by Brunner, Lieberkühn, and Peyer, have been called after those observers. The function of the first two is to secrete mucus for lubricating the mucous membrane; but, of late, the importance of Peyer's glands, more especially, in the economy, has perhaps been exaggerated; and, as has been previously remarked, they have been looked upon as the seat of many of those ataxic and adynamic fevers, which M. Broussais referred to the gastro-enteric mucous membrane generally. It does not appear probable, that these small bodies can be so intimately associated, in their morbid derangements, with the great vital organs, as to give occasion to the diseases, that have been ascribed to them. Their function has seemed to be to secrete putrescent materials from the blood,—but they are probably lymphatic ganglions, and have not perhaps any great agency in the causation of disease. Frequently, on dissection, they are found considerably enlarged; and this doubtless owing, at times, to their forming part of the lining of the tube, as M. Broussais suggested. At other times, they are enlarged and ulcerated, and thus become one of the expressions of typhoid fever, but not the essence of it; as the eruption of measles or scarlatina is only one of the expressions or manifestations of those diseases.

The mucous membrane, besides the secretion from the follicles, exhales the ordinary halitus of mucous membranes, and the two together are to a considerable amount. The daily quantity of the *liquor entericus* or *succus intestinalis*, as it has been called, was estimated by Haller at probably far beyond the truth.

In addition to this humor, the upper part of the small intestine receives the secretions from two important organs,—which, from their presumed agency in chylosis, have been termed *assistant chylopoietic viscera*,—the liver, and the pancreas, whose ducts open together.

From the upper portion of the small intestine more especially, the chyliferous vessels arise:—this part of the tube must, therefore, be regarded as the great seat of chylosis or chylification.

It is not until the fæces have reached the lower part of the small intestines, or the commencement of the large, that they attain the full fæcal odor. This is not produced altogether by the reaction of the elements of the food upon each other, but probably by a peculiar secretion from the intestinal glands; so that alvine discharges, possessed of the fæcal odor, may take place, even when little or no food has been taken; and, in the course of febrile affections, it becomes important to remove those, should constipation arise, as they are capable of inducing as much irritation as if they were the results of the digestion of alimentary matters. As long as life persists, secretions are poured into the alimentary tube throughout its whole extent from the lining membrane, as well as from the liver and pancreas; and if these are permitted to remain in the canal, they become the source of irritation and mischief. The argument often urged,—that it is not necessary for the bowels to be kept open in morbid cases, because no food has been taken,—is, therefore, fallacious.

Although in the upper portion of the small intestines an arrangement of the mucous coat exists—valvulæ conniventes—calculated to detain somewhat the aliment in its course downwards, and to extend the surface for the origin of chyliferous vessels, in no part of its extent does it present the character of a reservoir. The opposite to this is the case with the large intestine. Its saccated arrangement clearly shows it to be destined for the detention of the fæcal matters, until they have accumulated to such an extent as to give rise to a necessity for the act of defecation. In these saccated portions, the fæces are occasionally arrested, become indurated, and adhere to the mucous membrane, so as to excite irritation; and, when evacuated, they are in the form of small rounded masses, to which the name *scybala* has been given.

The whole of the intestinal canal is more or less endowed with the vermicular, oscillatory motion, which has been called *peristole* or *peristaltic action*. This motion is under the influence of reflex nerves, through which the muscular coat of the tube is excited to contraction, and the degree in which contraction occurs is greatly connected with the mode in which the function of digestion is accomplished.

Lastly, it is important to keep in view, that various organs are contiguous to the alimentary tube, whose functions are susceptible of modification by agents that affect it. Reference has already been made to the liver, and pancreas; and it will be found, that the uterus can, in this way, be considerably modified in its actions.

As regards the effect of a cathartic on the intestinal canal much difference exists according to the nature of the agent, and the dose in which it is exhibited.

When the lining membrane is but slightly stimulated, chylosis may be augmented, and a laxative tendency be induced; if it be more stimulated, the exhalation from it may be increased, and the irritation be extended by the sympathy of contiguity to the muscular coat, so that there may be a slight increase in the peristole; and if the specific stimulation be still greater, both the exhalation and the peristole may be largely augmented.

The effect of a mild cathartic may be almost wholly restricted to the evacuation of the tube; and but little effect be exerted on other organs, or on the general system. The first evacuations, that result from its operation, consist merely of the contents of the intestines: those that follow are mixed with the secretions of the canal, and of the liver and pancreas, with the drinks that have been taken: and at times fluids—as soups—may be readily detected in the discharges. Yet, as the appearance of an unusual quantity of bile in the matters ejected by vomiting may merely be an evidence that the excitement accompanying emesis has caused a greater secretion of bile, so—it must be borne in mind—the alvine discharges may assume an unhealthy bilious character under the operation of a cathartic, owing solely to the irritation it induces in the various secretory organs of the digestive apparatus. When the mild chloride of mercury, or the Pilula Hydrargyri, for example, is administered as a cathartic, it excites the lining membrane of the duodenum, and this irritation extends along the biliary ducts to the liver, the secretion from which is augmented. At the same time, it irritates the different follicles of the canal, and the exhalants generally, so that evacuations are occasionally induced by it, which resemble chopped spinach; and which are regarded by some, as indicating that it has succeeded in inducing a new action in the mucous lining of the tube. It can, hence, be understood, that after the operation of calomel, or of any purgative, whose action is chiefly exerted on the upper portion of the intestines, there may be a greater quantity of bile in the evacuations, without our being justified in inferring, that the individual is *bilious*;—and, that the increased flow of bile is occasioned by the purgative may be proved by discontinuing its use for some days, when the signs of bile in the evacuations will cease, and be reproduced when it is resumed.

It has been mentioned, that the mild chloride of mercury, and the "blue pill," affect the upper part of the intestinal canal; and the same may be said of rhubarb, colocynth, &c. There is, indeed, a singular preference on the part of different cathartics for different portions of the tube; some,—as the articles enumerated,—acting on the upper part; others, as aloes, on the large intestines, and especially on the colon and rectum; and others, as the saline and oily, affecting the whole tract of the intestines. Accordingly, a selection may be made so as to suit the particular view of the practitioner. At times, too, it is desirable to act on other organs through the intestinal canal, by means of sympathy; as when we wish to affect the liver or pancreas,—in which case cathartics are chosen, that act on the part of the tubes into which the ducts of those glands enter, —or the uterus, when one is selected that acts by preference on the lower portion of the tube, and affects the uterus by sympathy of contiguity. It is in this way, indeed, that aloes has acquired its reputation as an emmenagogue.

Cathartics act not only on the bowels, but on parts at a distance. Every portion of the organism is capable of being impressed by them. They are amongst the most generally useful, and applicable revellents that we possess; and, when given to such an extent as to cause hypercatharsis, they rapidly reduce the powers of the system, less, perhaps, by the copious exhalation of the serous portions of the blood, which they cause from the lining membrane of the intestines, than by the sympathy that exists between them and the vital organs. Reference has been made more than once to the destructive influence exerted on those organs by irritation—often unmarked by prominent symptoms—in the intestinal tube. It is by their mixed depletive and revulsive action that they become useful sorbefacients in hydropic affections, and cases of rapid disappearance of dropsical effusions under their operation are often witnessed.

In some experiments, instituted on dogs by MM. Aug. Duméril, Demarquay, and Lecointe, to test the modifications impressed on the function of calorification, by different therapeutical agents introduced into the economy, croton oil, gamboge, and colocynth, were tried; and it was found, that when they were given in such doses that the animals survived, a depression of temperature occurred in the first two or three hours, which was succeeded by an elevation, that might reach two degrees of the Centigrade scale. If, on the contrary, those agents were administered in poisonous doses, the depression was permanent and gradual.

Cathartics differ greatly from each other in their mode of operating. Some gripe much; others not at all. Some operate many times; others rarely more than once: although much, in this respect, depends upon the individual. Pharmacologists have generally divided them, according to the intensity of their operation, into *laxatives*, *purgatives*, and *drastics*, under which all the articles may be arranged. To these may be appended another division—that of *enemata*. The ancient humorists, who consider that most diseases are produced by the predominance of some particular humor, which needs evacuation, and that particular cathartics are eminently endowed with the power of fulfilling this object, divided them into *hydragogues*, *phlegmagogues*, *cholagogues*, and *pantagogues* or *panchymagogues*, according as their operation was exerted more especially upon the watery portions of the blood, on phlegm, bile, or on all the secretions from the tube.

The division of cathartics into laxatives and purgatives is convenient, and not inappropriate. *Laxatives* gently stimulate the mucous coat of the intestines, and augment the peristole but little: hence, they are well adapted for cases in which the sole indication is to unload the bowels of their contents. Some of them produce their effects entirely in a mechanical manner. Corn bread, for example, proves laxative, in consequence of the mechanical attrition of the particles of husk left mixed with it on the mucous membrane. In the same manner, bread made of unbolted flour is laxative, and becomes proper in the way of diet, when there is torpor of the digestive function; for which reason it has attained the name "*dyspeptic bread.*" Other laxatives, again, are special local stimulants, or affect the mucous membrane by their medicinal properties,—as sulphur, magnesia, &c. These, when given in a much larger dose than usual, may still be merely laxative. They do not induce full catharsis; and are, therefore, separable, with propriety, from the division of purgatives, many of which cannot, in the most minute doses, be made to act as laxatives.

Purgatives produce their effects like laxatives, but their operation is more powerful. They excite a copious exhalation from the mucous lining of the intestines, and augment the peristaltic action to a greater degree. It is in consequence of the evacuation of watery matters, produced by the operation of purgatives, that they are used as depletives in febrile, and inflammatory affections; and, from the excitation they occasion in the abdominal nerves, they are energetic revellents. This excitation is often shown in the tormina and irritation that precede and accompany their operation.

The more violent purgatives have been termed *drastics*. They produce a greater degree of irritation in the lining membrane of the intestines, and occasionally act upon the nerves of the stomach so as to induce nausea, and even vomiting. They belong generally to the resinous or resino-extractive substances; and one reason, why they excite such violent tormina, appears to be, that they are sparingly soluble, and adhere to the mucous coat, from which they are tardily detached. This view is corroborated by the circumstance, that if we add any substance to them, that aids their solubility, the griping may generally be prevented, or considerably mitigated.

After all, however, the division of cathartics into laxatives and purgatives, although generally convenient, and not inappropriate, is not always so. Much depends upon the individual, so that a laxative may purge drastically, whilst a drastic may scarcely purge at all. Still, these are exceptions.

Cathartics usually produce their full effect without being absorbed: they are altogether local stimulants to the mucous membrane of the intestines, and through it to the muscular coat. Yet, they can act by the way of the circulation, and the fact is another instance of the singular preference, exerted by medicinal agents for certain parts of the organism rather than for others. When a respectable physician, Dr. Hale, of Boston, injected castor oil into his veins, he speedily felt an oily taste in his mouth, which continued for a length of time, and the medicine produced much intestinal disturbance. Croton oil, when placed on the tongue of an apoplectic, in whom deglutition is impracticable, causes its ordinary cathartic operation. Rhubarb exerts the same agency when applied to the skin; and the milk of a wet-nurse, who has taken infusion of senna, rhubarb or other cathartics, may act upon the intestinal canal of the child.

As a general rule, the action of cathartics is in a direct ratio with the dose—within certain limits. Some, however, are so potent, that it is almost impracticable to reduce them to the point at which they are simple laxatives. Elaterium is one of these. On the other hand, there are agents, whose operation is altogether so gentle that if given to any amount, they will not be drastics. Such is the case with manna, magnesia, sugar, and olive oil. Their operation is always that of gentle cathartics or laxatives. There are substances, again, of this class, whose operation in a full dose is more violent than that which is considered to characterize the action of laxatives; and which, when given in much larger quantity, exert no more energy. Such is the general fact with calomel, castor oil, and rhubarb. The effect of these cathartics is commonly, indeed, but little appreciated, or, if appreciated, but little attended to. A teaspoonful or two of castor oil is often sufficient to evacuate the bowels, not only in health, but in chronic febrile and other affections,—where the object is simply to produce such evacuation. Exceptions, indeed, occur to this, but the rule is not the less general; and it is important to bear it in mind, inasmuch as the stomach is often extremely irritable, and but little adapted, in those affections, for the reception of a large amount of indigestible oleaginous matter. Given in these small doses, it is one of the best cathartics we possess for keeping the alimentary canal clear, when there is irritation of the gastro-enteric mucous membrane, as in gastric and other fevers. It has been maintained, indeed, by Rasori and others, that the action of all cathartics increases in a direct ratio with the dose within certain limits only, and that beyond these, the opposite is the fact,—the evacuant power being, in other words, directly as the dose up to a certain point, and inversely as the dose beyond that point;—that in the latter case they may act as sedatives without producing any cathartic effect whatever; and that, consequently, most purgative medicines may be considered not only as simple evacuants, but as antiphlogistics or sedatives. To this subject, however, reference will have to be made under the individual articles of the class, and especially under Calomel, where the difference of action according to the dose is more strongly marked perhaps than in the case of any other cathartic.

Substances, when largely divided, so that fresh and fresh portions come into contact with the lining membrane of the digestive tube, generally act with more efficiency, than when they are given in such form, that the cathartic touches in bulk the surface on which it has to operate. Thus, an ounce of the sulphate of magnesia, dissolved in half a pint of water, and taken by teaspoonfuls, at short intervals, will induce a greater action than if the whole solution were swallowed at once. This fact is elucidated by a case, which the late Dr. James Gregory, of Edinburgh, was in the habit of relating in his lectures. A boy was directed to take an ounce of Epsom salts, but having a strong objection to the taste of the cathartic, he resolved to form it into pills with crumb of bread. On making the pills of an appropriate size, he found they amounted to three hundred and sixty, a number so near to that of the days of the year, that he determined to make it correspond entirely. Accordingly, he divided them into three hundred and sixty-five portions, and took them all, one after the other. The effect was extraordinary. The most violent hypercatharsis was induced so as to endanger his life. This was owing probably to the gradual and successive breaking down of the pills in the canal, so that particle after particle came in contact with the mucous membrane.

We can thus understand, that a saline cathartic, dissolved in a large quantity of water, may act more powerfully than if the quantity of the solvent were less. In many of the saline mineral waters, which are employed as cathartics, the quantity of saline ingredients is extremely small. A pint of Seltzer water is found to contain but five grains of carbonate of magnesia, and seventeen of chloride of sodium. The same measure of Spa water contains nine and a half grains of carbonate of magnesia, and one quarter of a grain of chloride of sodium. The Aix-la-Chapelle water has five grains of chloride of sodium to the pint; the Balston, five grains of carbonate of magnesia, and eighteen of chloride of sodium; the Bedford, a grain and a half of chloride of sodium, and ten grains of sulphate of magnesia; and the Congress spring at Saratoga, twelve grains of carbonate of magnesia, and forty-eight grains of chloride of sodium. These facts are not favorable to the cathartic effect of such agents being owing to simple endosmotic action; for M. Poiseuille found —as elsewhere remarked—that very concentrated solutions generally cause endosmose of the serum of the blood, whilst dilute solutions have a reverse effect, and give rise to endosmose of the solution. Now, substances, which, when introduced into the intestinal tube, produce endosmose of the serum, as concentrated saline solutions, solutions of cathartic extracts, &c., act as cathartics, whilst weaker solutions of the same substances may pass into the blood and rather excite diuresis.

Many of the resinous purgatives cause much griping during their action,—apparently—as observed above—by adhering to the mucous lining, and acting as violent irritants; hence 'corrigents' are required to remove the disagreeable accompaniments of their ordinary operation. These may consist, either of substances, which add to their solubility; of agents, which, by augmenting the peristole of the canal, hurry on the cathartic, so that it does not remain, for any length of time, in contact with any one portion of the mucous membrane; or of such as shield the intestinal canal against its irritating influence.

Resinous substances are not acted on by the acid secretions of the stomach: but on reaching the small intestines, they meet with alkaline intestinal secretions, by the agency of which their solution and absorption may be effected. It can thus be understood, that the resinous purgatives may affect more prominently the lower portion of the intestinal canal.

As a general rule, the soluble cathartics act more speedily than others; yet the cathartic oils are exceptions to this; for they are scarcely, or not at all, soluble,—undergoing little or no change in the stomach. Castor oil becomes mixed with the various secretions and substances in the alimentary canal, and is divided into small filaments so as occasionally to deceive the practitioner. Some years ago Dr. J. P. Frank was requested to see a prince, who had been attacked with epilepsy. His physician, a respectable old practitioner, assured Frank, that he could at pleasure make his patient void thousands of filiform worms. As he was neither able to define the genus, nor species of these worms, the quantity of which, from his account, was prodigious, Frank requested to be a witness of the phenomenon. The physician administered a dose of castor oil, which produced several evacuations, in which were thousands of whitish filaments resembling small eels; but on an attentive examination, these supposed worms were found to consist entirely of castor oil, divided in the manner above mentioned.

Owing to the fact, that—as a general rule—soluble cathartics act sooner than those that are less so, we can understand that mixtures may operate more speedily than pills; that saline cathartics may act more freely if we allow liquids to be taken during their operation; and that resinous cathartics may be longer in operating than the saline. It has been attempted—but not with complete success—to show, that difference of solubility may account for certain purgatives acting more upon one part of the intestinal canal than upon another.

When demulcents are given along with acrid purgatives, they moderate the violence of their action, by shielding the mucous surface, so as to diminish the amount of local stimulation. In the same way, narcotics lessen the impressibility of the nervous system, and thereby diminish the operation of cathartics; but if much spasm exist in the intestinal canal, they may aid their operation. Suppose, for example, a state of constipation, accompanied with violent colic, but without enteric inflammation; the combination of a full dose of an opiate with a cathartic will allay the spasm, and facilitate the action of the latter. Indeed, where enteric inflammation actually exists—especially if copious bloodletting has been premised—such a union of sedative and cathartic is often followed by the most beneficial results. The different varieties of colic are treated almost wholly, by many intelligent practitioners, by a combination of calomel and opium.

If the desire be simply to evacuate the bowels, without heeding the revulsion which cathartics are capable of inducing, the rapid purgatives and forms of administration are to be chosen;—such as castor oil, and the various saline substances; but where habitual constipation exists, it is not always advisable to administer these agents in such doses as to act violently. A cathartic removes the contents of the canal, but it does not obviate the pathological condition, that gives rise to the constipation. On the contrary, in accordance with the law of compensation, which prevails so extensively in the animal economy, it is found, that the tendency to constipation is augmented after its operation,—diminished action of the exhalants of the mucous membrane, and of the muscular coat, succeeding to the exaltation of the vital manifestations produced by the operation of the cathartic: hence, if active cathartics be had recourse to in habits disposed to constipation, whenever this state exists, the person, in time, demands so imperiously the stimulation they excite, that he is unable to have an evacuation without them. This result is more liable to supervene after the action of certain purgatives than of others. Castor oil and croton oil are more exempt from it than other cathartics, whilst rhubarb is generally esteemed more obnoxious to the remark than any of the class.

The best mode of obviating this tendency to constipation is to avoid the exhibition of cathartics, that powerfully excite the organs directly and indirectly concerned in defecation, and to trust altogether to the employment of laxatives, and an appropriate regimen. The best laxatives for such purpose are those that affect the whole extent of the canal, and possess the property of developing its impressibility, or, to employ the language of Mr. Simon, of removing the "indolence of reflex action" in the muscular coat of the intestine. Such is the operation of saline cathartics. A good preparation of this kind is a mixture, formed by pouring a quart of boiling water on an ounce of sulphate of magnesia, and one drachm of bitartrate of potassa, and directing the patient to take a wineglassful of the solution every night and morning, until the bowels are made to respond properly. The bitartrate of potassa is laxative, and its acid character masks the disagreeable taste of the sulphate of magnesia. The combination rarely fails to restore the intestinal functions to their due condition; but it is occasionally necessary to persevere in its use for some weeks before the full beneficial results are obtained. The author has had the most ample opportunity for witnessing the good effects of this compound.

It is easy to conceive, that cathartics, which simply evacuate the contents of the bowels, may be more demanded in warm climates and seasons than in cold, in consequence of the erethism of the mucous membrane of the alimentary tube, which is developed during great atmospheric heat; yet, owing to this very erethism, as well as to the greater degree of sensibility of the nervous system, generally induced by the same atmospheric condition, drastic cathartics may have to be used with more caution.

The abuse of purgatives, like that of emetics, occasions great exaltation of the sensibility of the digestive tube. Broussais observes, in the commentary to his 155th proposition, that he had frequent opportunities for witnessing this effect in persons, who had taken the purgative of Le Roy, in the manner directed by that empiric,—that is, for several days in succession. So much irritability of the digestive apparatus was caused, that it was impossible to restore the equilibrium of action. At the present day, such abuse is by no means as common as it was half a century ago; the impropriety of keeping up perpetual irritation in the lining membrane of the intestines in diseases, often themselves arising from irritation in this very membrane, having become appreciated. It need hardly be added, that whenever such irritation or active inflammation is shown to exist, the operation of drastic cathartics, or of ordinary purgatives, is contraindicated, although it may still be important to preserve the tube free from morbid secretions—which cannot fail to be thrown out in such a state of the membrane—as well as from extraneous matters taken as aliment, which, under febrile heat, are more likely to undergo morbific changes.

During gestation, as well as menstruation, violent cathartics must be prescribed with caution; and those, whose action is exerted by preference on the lower part of the intestinal canal, should—as a general rule—be avoided. For this reason purgatives of the aloetic kind are not given, unless their operation is tempered by the addition of some substance, as soap, which, by adding to their solubility, diffuses their action over a large surface of the alimentary canal; or, by the addition of a narcotic, as hyoscyamus, which renders their operation less irritating. Many of the abortives, employed with a criminal intent, belong to the class of cathartics,—their primary operation being on the intestinal canal, and the uterus becoming affected by contiguous sympathy.

A selection of cathartics may be made, to a certain extent, to suit the age of the individual. In very young infants, the milder cathartics are employed,—as castor oil, magnesia, or rhubarb—combined, or not, with magnesia. Generally, during early childhood, there is a great predominance of acidity, so that absorbent laxatives are especially indicated; hence it is, that magnesia is in such common use. Calomel is also much given during the first periods of life, owing to the facility with which it can be administered. In old age, the warmer resinous cathartics are usually employed, and these are generally given in the form of pill.

In referring to the influence of the *moral* over the *physique*, it was remarked, that under particular emotions certain of the excretory functions are acted upon, and, amongst them, those concerned in defecation. Anxious dread, or excessive fear has this effect in a marked manner; and it has been probably experienced by every one under such circumstances. Certain emotions may, therefore, be looked upon as *mental cathartics*, although, as such, not capable of being employed in the treatment of disease.

In the administration of cathartics, some choice as to time can occasionally be indulged. For example, if the pilular form be chosen, and a substance difficult of solution be selected, it may be taken at bedtime. Accordingly, pills of mild chloride of mercury—to be followed the next morning by a saline or other soluble cathartic—are directed to be taken at the time of retiring to rest. On the other hand, saline aperients, castor oil, &c., are generally given in the morning, their operation being more speedy, and therefore more likely to disturb the patient if administered at night. Very early in the morning, when the stomach is entirely empty, a small dose of a cathartic often operates as speedily, and effectually, as a much larger taken after breakfast. Of course, when the administration of cathartics is imperiously demanded, no opportunity is left for choice of time.

During the action of cathartics, the dermoid system is extremely impressible; and if the patient be exposed to the partial and irregular application of cold, derangement of capillary action is apt to be induced, and if there be any tissue or organ, particularly liable at the time to take on diseased action, it will be apt to assume it. Should the cathartic operate more frequently, or more powerfully, than is desirable, a few drops of laudanum may be given in a glass of water; or a starch and laudanum enema may be administered. The latter, however, is rarely necessary.

ENEM'ATA.

Cathartics may be exhibited so as to act on the lower part of the intestinal tube by direct application. In this form, they are termed cathartic *glysters*, *enemata*, or *lavements*. When put in contact with the lining membrane of the rectum they irritate it; and, by sympathy of continuity, their influence is extended up the intestinal canal. Hence, they may be administered with advantage, when cathartics cannot be given by the mouth, as when deglutition is impracticable. Accordingly, in apoplexy, trismus, &c., this is a mode of exhibiting purgative and other remedies often had recourse to. It is obvious, too, that glysters may be used with advantage to aid the operation of cathartics; and, in cases of extreme debility, in which apprehension is entertained that cathartics administered in the ordinary mode may act too powerfully, glysters can be advantageously substituted. They are most valuable agents, and, until of late, have been too little employed in this country, as well as in Great Britain; but, on the continent of Europe, they form a part of the *boudoir* of every female; and are regarded to be indispensable to cleanliness and to health. In the '*Malade Imaginaire*' of Molière, Argan appears on the stage, reading his apothecary's bill, in which the clyster and its adaptation occur over and over again, without any feeling of outraged delicacy on the part of the auditors; whilst with us the slightest allusion to the operation or the instrument cannot be mentioned to 'ears polite.'

Even cold water, thrown into the rectum, excites the peristole of the intestines, and produces a salutary effect in inflammation of the lining membrane;—the cooling influence being propagated upwards by virtue of the extensive sympathy that exists between every part of the surface. In the same manner, warmth can be applied so as not only to act as a fomentation to the parts with which the material of the glyster comes in contact, but to have the soothing effect extended to parts above; and, by means of contiguous sympathy, to organs seated in the vicinity of the lower portions of the tube. With both these views enemata are administered; but they are chiefly used for the purpose of stimulating the canal, so as to occasion the evacuation of its contents. For this purpose, warm water, soap and water, salt and water, molasses and water, or gruel with the addition of salt or castor oil, are generally the selected vehicles; and if the desire be to excite considerable revulsion in the rectum, oil of turpentine may be added, either formed into an emulsion with the yolk of egg, or simply mixed with the gruel or other constituents of the enema. At times, where the idea exists, that constipation is the effect of spasm in some part of the canal, the tobacco glyster is directed. This may be given either in the way of infusion or of smoke, which latter may be thrown up through an ordinary tobacco-pipe;—the tobacco being placed in the bulb: it is then ignited and the bulb being put into the mouth, the smoke may be readily forced into the intestinal canal, by blowing through the tube. The exhibition of tobacco in either mode is attended, however, with danger; and therefore ought to be had recourse to with great caution. Cases, as elsewhere remarked, are on record of fatal results from an infusion of the strength directed in the pharmacopœias.

When glysters are administered by the ordinary bag and pipe, they rarely go farther than the rectum, and may therefore fail altogether in their operation. The syringe employed of recent date is capable of propelling the enema farther; but, at times, it also fails, especially where there is any obstruction at the termination of the sigmoid flexure of the colon, as is not unfrequently the case. Dr. O'Beirne has very properly directed attention to this point in the pathology of defecation, and has advised, that an elastic gum tube, like the ordinary stomach-tube, should be gently insinuated through the narrow portion at the sigmoid flexure, until it enters the colon; in this way, liquid fæces or flatus are occasionally brought away after every ordinary remedy has failed; and by attaching the external extremity of the tube to the stomach-pump, an enema may be projected into the colon and prove effectual, when the ordinary enemata, as usually exhibited, may have been administered in vain.

Some years before the appearance of Dr. O'Beirne's observations, the author had an interesting case of obstruction of the bowels in an aged individual, who, for almost the whole period of his existence, had held an honorable situation in his country's service. In this case, the colon appeared to be much distended by flatus. Injection after injection was thrown up by the only means at hand—the bag and pipe—but no relief was obtained. The symptoms became more and more urgent. Under these circumstances, the idea occurred, that if a hollow instrument could be passed up until it reached the part of the colon above the seat of the constriction, relief might be obtained. Accordingly, a large-sized elastic-gum male catheter was passed, with some difficulty, through the sigmoid flexure, and as soon as its extremity attained the colon, a considerable discharge of fetid gas took place, and relief was instantaneous. This course would probably be completely successful in affording relief, in those cases in which it has been advised to force air into the intestines for the removal of colic occasioned by the presence of air there;—a plan of treatment, by the way, which is minutely described by Swift, and the invention assigned to a medical philosopher of the Academy of Lagado!

The quantity of fluid to be administered in the way of enema must vary according to age, and other circumstances. For an infant, a few ounces may be sufficient; for an adult, from a pint to a quart; but if the desire be to wash out the colon, a considerable quantity may be necessary. In all cases, when given to produce a cathartic operation, the fluid ought not to be sent in too rapidly, as it is apt to excite the rectum to immediate action, so as to occasion its return, without bringing along with it more than the contents of that gut. The enema ought to stay long enough to excite, by sympathy, the whole tract of the large intestines at least; and, therefore, if it comes away in a few minutes—and especially if the discharge has but little fæcal matter mixed with it—it ought to be repeated.

SUPPOS'ITORIES.

It has been already remarked, that glysters are excellent revellents, when composed of materials possessed of excitant properties. The same may be said of 'suppositories,' which are special excitants, or ordinary excitants, according to the ingredients of which they may be composed. In early infancy, they are often employed to open the bowels, and are usually composed of turpentine soap,—a small conical piece, moistened, being forced up into the rectum, and left there, when it generally produces a free evacuation of the lower part of the canal. At times, the soap is smeared over with castor oil; at others, with turpentine, to add to the cathartic effect. In this way, as well as by glyster, any medicinal agent may be brought to affect the rectum; and accordingly, cathartics, opiates, &c., are so administered. It has been proposed to introduce a kind of galvanic suppository, made of two metals—zinc and copper—into the rectum, for the removal of constipation; and this has been attended, in some cases, with good effect; not, probably, in consequence of any specific stimulation of the nerves of the rectum by galvanism, but by its acting as an ordinary excitant to the nerves of the mucous membrane.

Another mode of employing the galvanic excitation is by forming a connection between two different metals; one being introduced into the mouth, the other into the rectum; but this apparatus is not possessed of more energy than the first; and both are perhaps largely indebted for their action to the local stimulation which their presence in the rectum engenders. The public and even the profession have been amused by various instruments invented for the application of galvanism to different parts of the body; and if their efficacy on the frame has not always been well marked, they have not failed to minister to the pockets of their inventors.

Dr. A. T. Thomson remarks, that the peristaltic action of the intestines may be increased by various external means; and, of these, he instances the electrical aura as highly useful in "simple torpor of the gut;" and the dashing of cold water on the lower extremities, which has succeeded in procuring the immediate evacuation of the intestines "in obstinate costiveness, particularly in the case of ileus, when all other means have failed." Both these agents produce their effect less as special excitants, than by modifying the nervous distribution. We have already seen, that there are many nervous modifications,—those through the influence of the mind especially,—which act upon the intestinal canal so as to produce catharsis.

Therapeutical Application of Cathartics.

The therapeutical application of cathartics will now be intelligible. They may, of course, be employed with various objects;—either to act as simple evacuants, as depleting agents, or as revellents.

Fever.—In the disordered state of functions constituting general fever—whatever may be its variety—their use is, throughout the disease, more or less indicated. In the state of erethism that exists in every portion of the dermoid structure, morbid secretions are necessarily formed, which, if not removed, induce irritation; yet although cathartics of a mild kind are needed to keep the intestinal canal free, it is—as has been before observed—a great mistake to over-excite the lining membrane of the intestines by drastics, in diseased conditions in which the absence of all irritation—mental as well as corporeal—ought to be inculcated; and this remark applies especially to fevers, which are apt to be accompanied by unusual irritation of the mucous membrane of the stomach, and small intestines. The plan to be pursued in such cases seems to be clearly indicated,—to attack the local inflammation, and the general increased action, by bleeding—general and local—and by the use of refrigerants; to keep the canal free by cathartics of the mildest kind, as a teaspoonful of the oleum ricini, repeated at intervals if necessary; and, under this system, the issue is, according to the author's experience, far more fortunate than where much irritation is kept up in the canal. Reflection, indeed, suggests at a glance, the impropriety and inconsistency of *any* irritating plan of medication in fever. We carefully employ sedative agents; recommend the most careful abstraction of light, and sound, and the avoidance of all irritation, *except* that which we officiously excite in a part of the system, which possesses intimate sympathetic relations with every other part of the organism; and, under this mode of management, many cases of continued and remittent fever, doubtless, run their course to a fatal termination, which, under a better system of treatment, would have terminated in health. It must be borne in mind, that, in these cases, the objection is not to cathartics in the abstract. The employment of mild cathartics to keep the alimentary tube entirely free from all morbid secretions, must be regarded as one of the most important points in the management of fevers, that are even accompanied with an unusual degree of erethism of the gastro-enteric mucous membrane. It is the powerfully irritating cathartic—that excites evacuation after evacuation, and exhausts the patient by irritation—which is so objectionable. The author is satisfied, that many cases of continued and remittent fever have arrived at a happy termination by the treatment above recommended, which might have eventuated unfortunately, had the irritating cathartic agency, so strongly inculcated by several distinguished teachers and authors, within so late a period as the last fifty years, been adopted. If we cast our eyes over the periodicals that are daily emanating from the press, we find that such agency is now less and less invoked, although the attention of the practitioner is equally directed to the gentle removal of all offending matters from the intestinal canal. Laxatives, or gentle cathartics—in other words—have taken the place of the more violent; and the improvement has been signal.

The evils of this perturbating system of treating fevers have been forcibly depicted by Dr. Stokes. "A common practice"—he says, "has prevailed in these countries, and indeed still exists to a very great extent, of making the patient take purgative medicines every day; and this, I regret to say, is too often done even in cases where the surface of the small intestine presents extensive patches of ulceration. Now, I will ask you, can anything be so barbarous as this, or can it be exceeded in folly or mischief by the grossest acts of quackery? Here we have an organ in a state of high irritation, and exhibiting a remarkable excitement of its circulation, and yet we proceed to apply stimulants to that organ, and to increase the existing irritation. Would it not be absurd, in a case of inflammation of the knee or elbowjoint, to direct a patient to use constant exercise and motion? Would it not be a very strange practice to apply irritants to a raw and excoriated surface? Yet something equally absurd and equally mischievous, is done by those who employ violent purgatives in a case of inflammation of the digestive tube in fever. This has been a great blot in the history of British practice. Calomel and black bottle, and even jalap and aloes, and scammony have been prescribed for patients laboring under severe and extensive dothinenteritis. Morbid stools are discharged, and the more morbid they are, the more calomel and purgatives does the physician give to change their character, and bring them back to the standard of health. I want words to express the horrible consequences. Too often have I seen fever patients brought into the hospital with diarrhœa, hypercatharsis, and inflammation of the mucous membrane from the use of purgatives administered before their admission. Practitioners will not open their eyes. They give purgatives day after day, a very easy practice, and one for which there are plenty of precedents; but it is fraught with the most violent consequences. I will freely admit, that the disciples of the school of Broussais have gone too far in decrying the use of laxatives altogether. But if they have lost hundreds by this error, British practitioners have *killed thousands* by an opposite plan of treatment. In cases of fever where there is no decided symptom of gastro-enteric disease, there can be no objection to the use of laxatives, *if required*, but they should always be of the mildest description. You will gain nothing by violent purging in fever; mild laxatives alone can be employed; and where there is any sign of intestinal irritation present, even these should be used with caution. There is one mode of opening the bowels, which you may always have recourse to with advantage in fever, viz., the use of enemata. There is not the slightest doubt, that occasionally accumulations of fæcal matter will take place, and tend to keep up irritation, but they should always be removed with the least possible risk of producing bad consequences. To purge in fever when intestinal irritation is present, is a practice opposed alike to theory and experience, and I have already stated that its results are most horrible."

In fevers of the synochal or inflammatory kind, unaccompanied by much gastro-enteric irritation, more powerful cathartics may be employed, the object being to use them as depleting agents, as well as for the purpose of evacuating offending matters. In such cases, recourse is more commonly had to saline cathartics, which, by exciting the action of the exhalants of the mucous membrane generally, occasion the evacuation of a portion of the more watery parts of the blood.

It has been inculcated by many therapeutists, that whenever the evacuations are fetid or ill-conditioned, it is necessary to repeat the cathartic, until their natural healthy character is restored; but if the alimentary canal be kept clear from the commencement of the disease, it can rarely happen, that this fetid character will be marked, or to such an extent as to demand much attention. Besides it must be recollected, that they may be rendered ill-conditioned by the employment of these very agents. When the mild chloride of mercury, for example, is exhibited for some time, it modifies the secretion from the different glandular and follicular organs, and gives occasion, as before mentioned, to green or dark-colored evacuations—'calomel stools'—very much resembling chopped spinach. This has, of course, to be borne in mind, as under the idea just mentioned, which prevails largely amongst those who do not reflect, the cathartic might be repeated with the view of removing the very condition it has induced. Dr. Chapman, of Philadelphia, has recommended, that in obstinate remittent and intermittent autumnal fevers cathartics should be continued until dark, tarry, fetid stools are discharged. This dark appearance he conceives to be a glutinous matter, which adheres to the intestines, and requires cathartics for its removal; but it appears by no means clear, that it may not be, in part, the effect of the repeated employment of cathartics deteriorating the intestinal secretions.

From what has already been said, it will obviously be improper to administer violent cathartics in yellow fever; which, like malignant remittents, is accompanied by malignant gastritis or gastro-enteritis.

Intermittents.—In intermittents, cathartics are rarely employed for cutting short the disease. The impression they make upon the nervous system is not sufficiently intense to break in upon the morbid catenation. They are generally employed in such cases for the purpose of removing the contents of the alimentary tube, so as to prepare the way for the administration of cinchona, or of some of its preparations, or of other antiperiodics; and in the progress of the affection, they are prescribed—as in other maladies—for removing morbid secretions, or whenever the bowels are in such a condition as to require their employment.

In all cases, where a doubt may exist as to the propriety of prescribing cathartics, there may be none as to the exhibition of enemata. They are, indeed, invaluable agents where the powers of life are so much reduced, that a rational fear is entertained as regards the administration of cathartics by the mouth. Even when food has not been taken, the canal must be kept free; as the vitiated secretions, and the product of the digestion of the different substances poured into the digestive tube, cannot fail, by their retention, to add to the irritation.

Eruptive fevers.—In all the exanthemata, the employment of gentle cathartics is indispensable to their judicious management. In small-pox, measles, scarlatina, &c.,—where the cutaneous surface is affected with erethism,—the extension of the skin, constituting the mucous membranes, and especially the gastro-enteric, cannot fail to participate in the general morbid condition; to have their secretions depraved; and consequently, to require the administration of evacuants.

With regard to the kind of cathartics best adapted for febrile affections in general, there is none perhaps so available as the oleum ricini. Next to this, the different salines, especially the sulphate of magnesia; and, if stronger cathartics are required,—which, as has been remarked, happens far more rarely than has been imagined,—the *pulvis jalapæ compositus*—which consists of jalap and bitartrate of potassa; or combinations of jalap and calomel, or of rhubarb and calomel. Where the object is, as in fever, to remove all offending matters daily, and once a day, from the alimentary canal, and not to excite a powerful revulsion, or a copious exhalation from the mucous membrane, the most unirritating agents ought obviously to be chosen; and of these the oleum ricini is decidedly the best.

Thoracic and abdominal inflammation.—Cases of thoracic inflammation do not exhibit any signal advantage from the employment of cathartics. These can act only by virtue of their depletory or revulsive properties, and their administration must be guided by general principles; but in inflammatory affections of the contents of the abdomen, or of its lining membrane, great care and discrimination are required to decide upon their utility, or the contrary.

In *peritonitis*, whether implicating the peritoneum proper, or its extensions investing the intestines, cathartics have to be employed with caution, for fear the irritation excited during their operation should add to the inflammation. In such cases, Dr. William Saunders was in the habit of saying, that the best mode of opening the bowels—in enteritis especially, which is usually attended with constipation—is the use of the lancet; and if this be followed up by a full sedative dose of opium, the bowels will often respond without the aid of any cathartic. The constipation is, in such cases, dependent upon the inflammation; and when this—the cause—is removed, the effect will yield also. Where enteritis is seated in the mucous coat, irritating purgatives should be given with extreme care. A case, indeed, can scarcely be imagined, in which they can be indicated; yet the exhibition of a gentle cathartic,—simply with the view of keeping the canal free from morbid secretions, and morbific matters, which cannot fail to be present in such a diseased condition of the lining membrane,—is amongst our most valuable means of medication. This is signally the case in *dysentery*,—in which the inflammation is chiefly seated in the lower portion of the intestinal tube,—and in the early stages of *cholera*, common as well as spasmodic.

In *diarrhœa*, which arises from irritation of the lining membrane of the intestines, it was at one time the custom to employ no agents of any kind. The disease—as already remarked—was looked upon as an effort of nature not to be interfered with; whilst by others an opposite view has been maintained, and astringents have been advised from the commencement. Of the two views, the latter is more markedly erroneous, and mischievous in its consequences. The disease is one of irritation, and the exciting cause is often extraneous matters in the intestines themselves; accordingly, it may be maintained, as an almost universal rule, that gentle cathartics should be exhibited in the first instance, and be repeated if necessary; and that astringents should not be used, unless an asthenic condition should supervene,—as in the gleet, which generally succeeds to acute inflammation of other mucous membranes.

If the propriety of the use of gentle cathartics in the case of diarrhœa affecting adults be admitted, the remark must apply *à fortiori* to the diarrhœa of infants, who are extremely liable to erethism of the dermoid tissue, and to the formation of acid in the primæ viæ, which has often considerable agency in the development of the disease; hence the acid smell of the evacuations. Often, too, accompanying this state, there are manifest indications of an inflamed condition of the gastro-enteric mucous membrane.

Dyspepsia.—In the variety of dyspepsia, which consists of an irritated condition of the lining membrane of the stomach, violent cathartics are improper; but laxatives may be—and usually are—indicated. Indeed, in atonic dyspepsia, the same system is advisable; and an occasional brisk cathartic may be exhibited with advantage. When employed in this manner, a fillip is given to the digestive function, which is often salutary; whilst if the cathartic be often repeated, a degree of sensibility and irritability may be induced in the bowels, which cannot fail to add to the mischief.

Hepatic Diseases.—In hepatic phlegmasia, engorgement, or torpor, cathartics have been regarded as eminently useful, by acting immediately on the radicles of the portal veins; and thus diminishing the quantity of fluid, that passes to the liver by the vena porta. From what has been remarked, regarding the use of emetics in jaundice, and in cholelithus or gallstone, it will be understood, that cathartics may have a beneficial agency, by stimulating the intestinal tube,—the excitation being conveyed by continuous sympathy to the liver and its accessories; but where there is organic mischief, as happens in most of the protracted cases—especially such as occur in those of broken-down constitutions—they must be given with caution.

Constipation.—Of the utility of cathartics in constipation we have already treated. They ought not—as there stated—to be administered in such doses as to act as powerful local stimulants, on account of the depression which always succeeds to the superexcitation. The proper mode is to prescribe them in small doses, often repeated, along with a properly regulated diet. A brisk cathartic may obviate the constipation for the time; but no permanent cure can be effected, without striking at the root of the evil, by a proper and protracted laxative treatment and regimen.

Colic.—In the different varieties of colic, cathartics have been much employed. The intestinal pain is generally caused by overdistension of the coats by flatus, or by accumulated or irritating aliments; and the method usually adopted for removing the disease is to excite the peristaltic action of the intestines, so as to diffuse the flatus over a larger surface, or to remove the source of irritation. This may often be effected by a union of cathartics and aromatics, or, when the pain is extremely violent, by the substitution of an opiate for the aromatic, to allay the spasm, which forms a part of the disease. Perhaps in all cases of colic, the best course is to premise a full dose of an opiate, and afterwards to administer a cathartic by the mouth or rectum, should this be necessary.

Hemorrhage.—The rules that guide us in the administration of cathartics in hemorrhage vary according as it is of the active or passive kind. In the former they may be proper; in the latter not. In apoplexy, they are employed both as depletives and revellents; but more for the latter purpose than the former. During the apoplectic seizure, one of the best revellents is a stimulating enema; and this can be administered when deglutition is impracticable. Croton oil is also given under similar circumstances. If a drop of this be put upon the tongue, it passes by imbibition into the bloodvessels, and seeks out the intestinal canal for its operation, by virtue of that singular action of preference, of which there are so many marked examples.

In the *epistaxis*, that occurs about the period of puberty, the depletion and revulsion produced by a full dose of sulphate of magnesia are often sufficient to put a stop to it; and, whenever signs of vascular activity exist in it or in other hemorrhages, cathartics are clearly suggested. The same may be said of their employment in cases of *hæmoptysis*, although mental and corporeal quiet are absolutely necessary during the attack, and for some time afterwards; but, in the interval, no doubt can arise as to the propriety of their administration. The saline cathartics, which operate upon the whole of the intestinal canal, and augment the exhalation from the mucous membrane, ought to be selected.

In *hæmatemesis* or *vomiting of blood*, whilst cathartics have been strongly recommended by some, they have been as warmly reprobated by others. The German practitioners generally object to them; yet the objection does not appear to be well founded. A saline cathartic, by acting upon the whole of the intestinal canal, developes a succession of sympathies during its operation, which derives greatly from the concentration of vital activity towards the stomach, that is present in active hæmatemesis. Besides, certain of the saline preparations—as before shown—are somewhat astringent; the supersulphate of magnesia, of potassa, or of soda, for example,—which may be formed extemporaneously, by adding the elixir of vitriol, or dilute sulphuric acid, to a solution of sulphate of magnesia, of sulphate of soda, or of sulphate of potassa,—comes in contact with the vessels pouring out the blood, and by its directly astringent properties arrests the hemorrhage, and its cathartic action may prevent a recurrence. It has been stated, elsewhere, that many cases of hæmatemesis are dependent upon obstruction in some other organ than the stomach,—and especially in the uterus; and where there is torpor of this last viscus—such as exists in many, if not in most cases of *amenorrhœa*—the action of the cathartic is well adapted for communicating a salutary stimulation to the uterine functions, through contiguous sympathy.

In *menorrhagia*, care has to be taken in the administration of cathartics owing to the fact just mentioned,—that they excite the action of the uterus by the sympathy of contiguity; but in *hæmaturia*, such cathartics as are not accompanied with a diuretic operation may be beneficially employed,—the derivation of nervous and vascular influx from the urinary organs being attended with good effects. With this view the oleum ricini is had recourse to with advantage.

Hemorrhoids.—In hemorrhoids, the mildest kinds of cathartics are serviceable; whilst the more violent are injurious. Obviously, too, such cathartics should be avoided as act upon the lower portion of the alimentary tube; unless some addition be made to them, which rids them of their objectionable features. Accordingly, when aloes is given, it is generally in small doses, and associated with some narcotic,—as hyoscyamus. The mild chloride of mercury is a cathartic, which generally acts more energetically upon the upper portion of the intestines; but, with some, it irritates the rectum; and, consequently, such individuals should avoid its use when affected with hemorrhoids or any disease of the rectum. Castor oil, and sulphur, are the best laxatives in such cases. These remarks apply equally to procidentia, in which drastic cathartics could not fail to do mischief.

Pregnancy.—In pregnancy, powerful cathartics must be avoided, for reasons that have been previously assigned.

Head affections.—In various head affections, and especially in *encephalitis*, whether involving the brain or its membranes, or both,—cathartics would clearly be advantageous, by virtue of the revulsion they effect, did not the inconvenience, to which the patient is subjected by the motion necessarily attendant on their operation, often preclude their employment.

In *mania*, they are, at times, absolutely required, in consequence of the torpor, that occasionally exists in the intestinal tube. From this cause, an accumulation at times takes place in the large intestines to a surprising extent; and the use of the scoop is required to remove the indurated fæces that have collected in the rectum; after which, injections of cold water may be thrown into the large intestine to restore its tone.

Owing to the torpor of the nerves of the tube, or rather to the cerebral abstraction and excitation, which prevent the usual sensitive impressions from being duly appreciated, the most violent drastics are occasionally demanded—as oleum tiglii, or elaterium—and even these are often ineffectual, unless bloodletting is premised, which, by reducing the nervous energy, enables smaller doses to produce the wished-for operation. Sometimes considerable difficulty is experienced in the administration of any remedy by the mouth,—the patient obstinately closing the jaws, and resisting every effort to separate them. This determination may be broken in upon—especially after bloodletting—by pressing strongly on the parotid gland, which occasions so much pain, that the maniac yields and the jaw is depressed.

Neuroses.—In all the neuroses, it is important to keep the intestinal tube free; as irritations, seated there, react upon the cerebro-spinal axis, and add to the mischief.

Hysteria, which is ranked, though improperly, by Pinel, in accordance with antiquated notions, as a *névrose de la génération*, is often associated with this condition of the bowels; and therefore requires the use of cathartics. Great nervous torpor of the whole system is present in many cases of this protean malady, requiring the administration of cathartics as revellents, both by the mouth, and rectum.

Under the head of emetics it was remarked, that irritations of the stomach and bowels, produced by improper diet or by morbid secretions, are a grand exciting cause of *epilepsy*, as well as of *infantile convulsions*. Cathartics are, therefore, almost universally proper in these alarming attacks; but care must be taken not to repeat them sufficiently often to develope the sensibility of the tube, as they might react on the cerebro-spinal axis, and augment the very mischief which they were administered to remove.

Chorea—a disease of the nervous centres, accompanied with great torpor of the digestive function—requires a union of tonics with cathartics for its removal. Dr. Hamilton, of Edinburgh,—who has been the cause of much valuable use, and at the same time of much abuse of the cathartic medication,—places his main reliance on it, in the cure of this singular affection.

One of the varieties of *trismus*—the *trismus nascentium*, or "lock-jaw of the new-born"—is often dependent upon irritation seated in the intestinal canal, and is occasionally removable by gentle cathartics, as the oleum ricini. In this part of the Union, it is rarely witnessed; but in the southern and warmer regions, it is a fatal malady. At the Havana, according to Don Ramon de la Sagra, of one hundred children dying under ten years of age, nineteen per cent. amongst the whites perish of it within the first seven days, and twenty-four per cent. amongst the infants of color; whence the affection is called there the "disease of the seven days" (*mal de los sieta dias*).

In violent cases of *tetanus* in the adult, cathartics constitute one of the agents to which recourse is almost invariably had, along with other, and more essential,—as narcotics. When swallowing is impracticable, stimulating enemata are often administered, with the view of exciting a new impression by revulsion; or opium is given in the same manner, where the object of the practitioner is to endeavor to overpower, by sedatives, the inordinate erethism of the cerebro-spinal axis. When deglutition can be effected, a union of cathartics and opiates is often employed to fulfil similar views. The oleum tiglii is, in these cases, a useful cathartic, both when deglutition exists, and when it is impracticable.

Dropsies.—Cathartics are among the most valued and valuable agents in the treatment of dropsies, especially when these are of an active kind. In the passive, they must necessarily be used with more caution. The division of cathartics, to which recourse is had, is that of drastics, and such especially as produce copious watery discharges,—or in other words, as act powerfully on the secretory apparatus of the mucous membrane of the alimentary canal. Elaterium is one; but it must be cautiously administered on account of the difficulty that exists in regulating its operation. Calomel and gamboge are often selected for this purpose. These hydragogues—as before mentioned—act in two ways in the curation of dropsy; first, they diminish the amount of circulating fluid, and thus add to the activity of imbibition; and secondly, they excite a powerful revulsion, which gives rise, indirectly, to sorbefacient agency.

Intestinal worms.—Cathartics are often employed as anthelmintics; but their main effect can only be the removal of existing worms; they do not prevent their re-formation; besides, if often given, they may debilitate the system generally, and the digestive function in particular, and thus favor the predisposition to the development of those parasites. On the other hand, however, an occasional brisk cathartic may give, rather than diminish, tone, by breaking in upon the monotonous execution of functions, and exerting a salutary impression of excitation.

Such are the chief disorders and purposes for which cathartics are administered. It is obviously almost as impracticable, as it is unnecessary, to refer to every case, in which their employment may seem to be indicated. Their main effects on the general system are —depletion and revulsion; and a wise discrimination will suggest the particular cases, in which such agency is demanded. Their immediate effects upon the parts with which they come in contact are obvious; and a very slight degree of reflection—after the pathological lesion has been correctly appreciated—will enable the practitioner to decide as to the propriety of their administration.

SPECIAL CATHARTICS.

I. *Laxatives or Mild Cathartics.*

1. MANNA.

Manna is the concrete juice of *Ornus Europæa, Fraxinus Ornus* or *Flowering Ash;* Sex. Syst. Diandria Monogynia; Nat. Ord. Oleaceæ (Lindley); a native of the south of Europe, especially of Calabria and Sicily. It is chiefly obtained by making incisions in the stem. It also issues in part spontaneously from fissures; and in part from punctures made by an insect, the *Tettigonia Orni* or *Cicada Orni.* The juice, as it issues, is nearly colorless, and somewhat viscid; but it soon concretes in the sun into a yellowish opaque substance. Some of it is permitted to fall on the ground, or on leaves placed to receive it; or to trickle down the trunk; but where care is taken, the leaves of the ornus are stuck into the bark below the incisions, which guide it to receptacles formed of leaves of *Cactus Opuntia* or Indian Fig; and straws and twigs are inserted into the incisions, so that the juice concretes in the form of stalactites, and is readily detached clear from the bark. The collection of manna commences in July, and continues till October,—the best kind being obtained during the month of August, or in the height of the season; and the inferior qualities towards the close.

Manna is imported chiefly from Palermo and Messina, but likewise from various parts of Italy and Sicily. The quantity, on which duty was paid in England in 1839, according to Dr. Pereira, was 13,493 pounds. There are several varieties met with in commerce. The one, which is the purest, is FLAKE MANNA—*Manna Cannulata.* This is in irregularly shaped pieces resembling stalactites, and obtained in the manner above mentioned. It is light, brittle, of a white or pale yellowish-white color; has a faint, rather pleasant odor, and a sweet somewhat peculiar taste, becoming ultimately rather acrid. When broken, flake manna has a crystalline or granular structure.

MANNA IN SORTS or *Common Manna* consists of whitish or yellowish fragments similar to the last variety, but smaller, and mixed with a soft, viscid, uncrystallized brownish mass, like that which constitutes the commonest variety—the FAT OR FATTY MANNA, which is in the form of a soft viscous mass, of a dirty yellowish-brown color, containing few crystalline fragments, and full of impurities. Under the name SICILIAN TOLFA MANNA, Dr. Pereira describes an inferior kind, corresponding to the manna in sorts. It is thought by him to correspond in quality to TOLFA MANNA produced near Civita Vecchia, which is but little valued.

Manna has frequently been subjected to analysis, and been found to contain about 60 per cent. of a peculiar sweet principle called *mannite;* a little common sugar, partly crystalline and partly uncrystallizable; extractive matter; and about 32 per cent. of moisture. The extractive matter, which is nauseous, has been regarded as the laxative principle; yet mannite would seem to be as laxative as manna itself.

Manna, like sugar, is nutritive; but it is not used with us on account of this property. It is a gentle laxative, yet does not always act without inducing tormina. By females and children it is occasionally taken alone; but more frequently is prescribed as an adjunct to other remedies of the same class, as senna, and sulphate of magnesia, whose taste it somewhat conceals, whilst it adds to their cathartic action. According to the author's taste, however, the addition of the manna is no improvement.

The dose for an adult, is from one to two ounces; for children from one to three drachms. In the case of the former it may be eaten; of the latter it may be taken dissolved in water, simple or aromatic, or in tea or coffee.

MANNITE.—Mannite has been brought forward as one of the "new remedies." It is obtained by treating manna in tears with boiling alcohol; then filtering and suffering it to crystallize: by rest and refrigeration mannite is precipitated in small, beautiful white needles. It is used under the same circumstances as manna, and the dose is much the same.

2. SULPHUR.

Sulphur of the Pharmacopœia of the United States is the *sublimed sulphur* of some other Pharmacopœias. It is found both in the inorganic and the organized kingdom. In the former, it occurs either imbedded in rocks—*common native sulphur;* or produced by volcanic action by sublimation—*volcanic sulphur.* In the organized kingdom, it is found in many plants;—in the liliaceæ, for example, in garlic; in the cruciferæ, in mustard; and in assafœtida of the umbelliferæ. It is also found in certain animal substances, as eggs, urine, &c. In combination, in the state of sulphuric acid, it occurs extensively. It may be procured by purifying native sulphur, or by decomposing the native sulphurets; but the sulphur of commerce is generally obtained in the former way. It is brought chiefly from Italy and Sicily. During the year 1834, according to Mr. McCulloch, not less than 507,808 cwt. of rough brimstone were imported into England, of which 485,756 cwt. were from Italy, or rather Sicily.

Native sulphur is met with in small quantities in different parts of the United States.

Crude sulphur is prepared from native sulphur, either by being subjected to a rude process of fusion, or by a process of distillation in earthen pots. In this state, it is imported, and purified. The process formerly adopted, was to submit it to fusion in an iron caldron; when the earthy impurities subsided, and the liquid sulphur was ladled out and cast into moulds, so as to form *roll sulphur* or *roll brimstone.* The improved method of purification is to distil it in an iron still, the sulphur being allowed to pass into a chamber, on the walls of which it is deposited in the form of *flowers of sulphur.* If, instead of permitting the sulphur to enter the sulphur chamber, it be made to pass into an appropriate receiver, the sulphur distils over, and condenses into a liquid, which, when solidified, constitutes the *refined sulphur* of commerce. If this be cast in wooden moulds, it forms the *stick* or *roll* or *cane sulphur* or *brimstone.*

Flowers of sulphur, or *solid sulphur,* may be prepared from the metallic sulphurets by similar processes.

The dregs that remain after the purification of sulphur constitute *sulphur vivum,* formerly used externally, but now never employed except by the veterinary surgeon. It has hence obtained the name of *horse brimstone.*

Sublimed sulphur, prepared by any of these methods, contains more or less sulphuric acid, owing to some of it undergoing combustion. This can be removed by washing, after which we have *sulphur sublimatum lotum* of certain of the pharmacopœias, and of the United States Pharmacopœia of 1830. In the last edition, however, Sulphur means the sublimed article; and Sulphur lotum or *washed sulphur*, sublimed sulphur thoroughly washed with water. As met with in the shops, it is in fine powder, of a bright yellow color, and of a peculiar smell and taste. It is insoluble in water, but soluble in alcohol, ether, and the oils,—both fixed and volatile. It is wholly volatilized by heat, and ought not to change the color of litmus paper.

Sulphur is one of the gentlest laxatives; producing scarcely any augmented secretion from the follicles and exhalants of the intestines. Being so mild in its action, it has been given in cases of pregnant females; and it is a common laxative in hemorrhoidal affections. When it is necessary to add to its cathartic agency, magnesia, or bitartrate of potassa may form the adjunct. The great objection to sulphur is, that even its internal use occasions the patient to exhale a disagreeable sulphurous odor, owing to the formation of sulphuretted hydrogen. Millon and Laveran assert, that it is not soluble in the intestinal secretions, and cannot, therefore, be absorbed; but the fact, that a sulphurous odor is exhaled from the body, is sufficient evidence that it does enter the circulation; and all clinical observation confirms this.

Sulphur in combination with bitartrate of potassa, or alone, mixed with molasses, has long been a favorite "purifier of the blood," and is often given, spring and fall, as a domestic remedy. Its dose, as a cathartic, is from ʒj to ℥ss. It may be given, as before remarked, in molasses, or diffused in milk.

SULPHUR PRÆCIPITA'TUM, PRECIP'ITATED SULPHUR, *Lac sulphuris*, prepared by decomposing a sulphuret of lime by means of chlorohydric acid, was officinal in the British Pharmacopœias, and is still so in that of the United States. It possesses no advantages over sulphur lotum. It is much whiter, and in a state of fine division. It is said to be exceedingly liable to adulteration, and, on this account, has been left out of the British Pharmacopœias. According to Dr. Pereira, in the preparation of nearly the whole of the precipitated sulphur, sulphuric acid is substituted for the chlorohydric, by which the product contains about two-thirds of its weight of sulphate of lime; and he adds, that he was informed by an extensive manufacturer of the article, that a firm, the name of which he mentions, was almost the only one that bought the pure kind.

Pure precipitated sulphur, like sublimed sulphur, is wholly volatilized by heat.

Sulphur enters into the preparation of *Emplastrum Ammoniaci cum Hydrargyro*, *Hydrargyri Sulphuretum Nigrum*, *Hydrargyri Sulphuretum Rubrum*, *Potassii Sulphuretum*, and *Sulphuris Iodidum*, of the Pharmacopœia of the United States.

3. MAGNE'SIA.

Magnesia, calcined or burnt magnesia, is prepared by exposing carbonate of magnesia to a red heat in an earthen vessel, until the carbonic acid is wholly expelled, and the protoxide of magnesium remains. It is a light, white powder, devoid of smell, and almost tasteless. Its specific gravity is 2·3. When moistened with water, it exhibits an alkaline reaction. It is very sparingly soluble in water, and less so in boiling water than in cold. It absorbs carbonic acid; and, therefore, should be kept from contact with air.

The tests of its purity, as given in the Pharmacopœia of the United States (1842), are,—that it should dissolve wholly without effervescence in dilute chlorohydric acid, which would prove the absence of carbonate of magnesia, with which it is often mixed; and that the solution in dilute chlorohydric acid should yield no precipitate with oxalate of ammonia, or chloride of barium,—proving the absence of lime, and of sulphates.

Magnesia is a gentle laxative, and as such is employed in pregnancy, affections of the rectum, &c., where mild aperients are needed. It is especially valuable where constipation is attended with cardialgia from too great a secretion of the gastric acids; and in children it forms an admirable laxative, owing to the great predominance of acid in them. It is also readily taken by them, when mixed with milk, and sweetened. It is an excellent adjunct to carminative mixtures, where it is advisable to increase the peristole of the bowels; and is often prescribed for this purpose to children. (*Magnes.* gr. xv; *Ol. anisi*, seu *Ol. carui* gtt. iij; *Aquæ* f℥j; *Sacchar.* ʒi. M.—Dose, a teaspoonful occasionally.) Where diarrhœa is attended with acidity, as it often is, magnesia may be needed to facilitate the removal from the bowels of the redundant acid; but where it is desirable to neutralize the acid, and at the same time to induce a constipating effect, prepared chalk may be prescribed.

The dose, as a cathartic, to an adult is from a scruple to a drachm, to infants from two to eight or ten grains. Occasionally, it does not operate, owing to its not meeting with acid in the stomach: its action, in such cases, may be facilitated by drinking lemonade, which forms a citrate of magnesia that acts as a mild aperient.

It is proper to remark, that where magnesia has been taken for a long time, and in large quantities, it has occasionally accumulated in the bowels, and given rise to unpleasant effects.

Magnesia enters into the composition of *Pilulæ Copaibæ* of the Pharmacopœia of the United States.

4. MAGNE'SIÆ CAR'BONAS.—CAR'BONATE OF MAGNE'SIA.

Carbonate of magnesia, subcarbonate of magnesia, hydrated subcarbonate of magnesia, magnesia alba, occurs, although not in great abundance, as a mineral; but that of the shops is prepared on a large scale by decomposing sulphate of magnesia by an alkaline carbonate; the consequence of which is the precipitation of carbonate of magnesia. As it is prepared by the wholesale chemist, no formula for it is given in the Pharmacopœia of the United States. The greater part of that which is used in this country is imported from Scotland. In New England, it is prepared from the bittern of the salt works, which consists chiefly of sulphate and muriate of magnesia; and in Baltimore, it is made from the sulphate of magnesia extensively prepared there.

Carbonate of magnesia is a light, white, inodorous, and almost insipid powder. It is nearly insoluble in water, but readily dissolves in aërated or carbonated water. It is distinguishable from pure magnesia by effervescing with acids. Its adulterations are the same as those of magnesia, and may be detected nearly in the same manner.

The therapeutical properties of carbonate of magnesia are almost the same as those of magnesia. As, however, it contains carbonic acid, this is set at liberty when the salt meets with acid in the stomach, and is apt to excite flatulence. Its dose, as a laxative, is from half a drachm to a drachm, given in milk, with which neither it nor magnesia mixes well without great care. Its admixture is facilitated by first rubbing it with syrup.

A *fluid magnesia* has been much recommended by Sir James Murray, and Mr. Dinneford. The preparation of the latter is said to contain from 17 to 19 grains of carbonate of magnesia in every fluidounce. It is a *condensed solution of magnesia* in carbonated water.

5. FICUS.—FIGS.

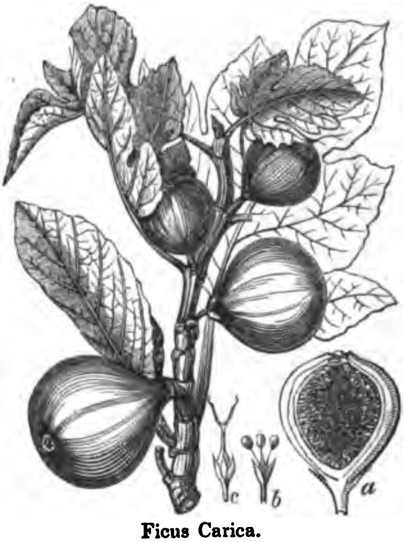
Figs, in the Pharmacopœia of the United States, are the dried fruit of *Ficus Carica*, the Fig Tree, FAMILY, Urticaceæ, which is a native of Asia and Southern Europe, but cultivated in the gardens of this country. The figs, when ripe, are dried in the sun or in ovens, and are afterwards packed in drums, baskets, or boxes. They are chiefly brought to the United States from Smyrna; and the Turkey or Smyrna figs are the largest and sweetest; and therefore the best. Dried figs form a very considerable article of commerce in Provence, Italy, and Spain, besides affording, as in the East, a principal article of sustenance for the population. The annual importation into Great Britain has been estimated at about 20,000 cwt.

The chief constituents of figs are mucilage, and sugar of figs, which greatly resembles the sugar of the grape.

Like other saccharine articles, figs are laxative; and by virtue of their mucilage they are demulcent likewise. They are eaten in cases of habitual torpor of the bowels; and enter into the composition of *Confectio Sennæ* of the Pharmacopœia.

The split fig retains heat well, and is, therefore, occasionally applied to inflammatory tumors to promote suppuration.

Fig. 15.



Ficus Carica.

6. CAS'SIA FIS'TULA.—PURGING CAS'SIA.

Cassia Fistula is the fruit of *Cassia Fistula*, *Cathartocarpus Fistula*, *Pudding pipe tree* or *Purging Cassia;* SEX. SYST. Decandria Monogynia; NAT. ORD. Leguminosæ, which is supposed to have been originally a native of Upper Egypt and India, whence it has spread to various places. It is now found abundantly in Hindostan, China, the East India and West India Islands, and in South America.

The fruit—the officinal portion—as imported from the East and West Indies and South America, is in pods, from nine inches to two feet in length, which are cylindrical, slightly curved, and of a dark brown, nearly black color. Internally, the pod is divided into numerous thin transverse partitions,—and each of these contains a hard, flattened, oval-shaped seed, surrounded by a soft, black pulp resembling an extract.

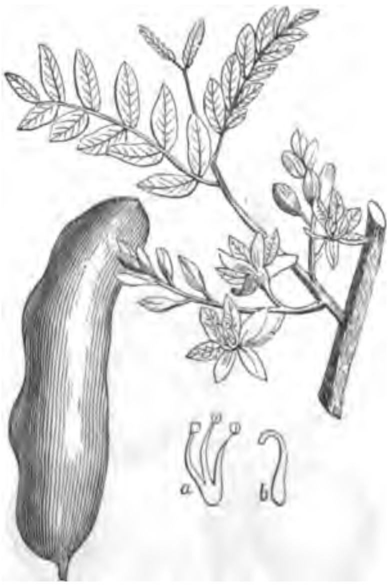
CAS'SIÆ FIS'TULÆ PULPA, PULP OF PURGING CASSIA, is separated by pouring boiling water on the bruised pods to soften the pulp; then straining first through a coarse sieve, and afterwards through a hair one, and boiling down to a proper consistence. When subjected to analysis, the common or African variety yielded 61 per cent. of sugar; the American 69 per cent.

Cassia pulp is laxative in small doses; in a larger, purgative, but it does not act kindly, being apt to induce nausea, and tormina. It is rarely prescribed alone,—never perhaps in this country; but enters as one of the laxative ingredients into the *Confectio Sennæ* of the Pharmacopœia of the United States. Its dose as a mild laxative is stated to be ʒj to ʒij; as a purgative, ʒij to ℥j.

7. TAMARIN'DUS.—TAM'ARINDS.

Tamarind is the preserved fruit of *Tamarindus Indica;* SEX. SYST. Monadelphia Triandria; NAT. ORD. Leguminosæ; a tree which is indigenous in the East and West Indies. The fruit is a pod from two to six inches long, which consists of a ligneous husk, enclosing a pulpy texture, which is traversed by numerous branching fibrils, within which one or more seeds are imbedded. The officinal part is the pulp between the seeds and husk. It is usually imported along with the seeds, and preserved in sugar. Tamarinds are brought to this country from the West Indies.

Fig. 16.



Tamarindus Indica.

When subjected to analysis, the pulp yields citric, tartaric and malic acids; bitartrate of potassa; sugar, gum, vegetable jelly, parenchyma, and water. It has an agreeable sweetish acid taste, and readily imparts its properties to water.

Tamarinds are gently laxative, but they are rarely given alone. They were formerly prescribed with other cathartics, as with infusion of senna; but have been considered—probably on insufficient grounds—to diminish the operation both of it and of the resinous cathartics. They form part of the *Confectio Sennæ* of the Pharmacopœia of the United States; for which purpose they are digested with a small quantity of water, until they become of uniform consistence; after which, the seeds and filaments are separated by pressing through a hair-sieve. This is the **TAMARINDI PULPA** or *Pulp of Tamarinds* of the Pharmacopœia.

8. PRUNUM.—PRUNES.

Prunes are the dried fruit of *Prunus domestica*, *Plum tree;* SEX. SYST. Icosandria Monogynia; NAT. ORD. Rosaceæ; which is cultivated in temperate regions everywhere; but is supposed to be a native of Syria, especially near Damascus. The dried fruits are called *Prunes* or *French plums.* They are chiefly imported from the south of France, and are derived from the Saint Julien variety; the table prunes being obtained from the larger kinds of plum—as the Saint Catherine and the Reine-Claude or green-gage.

The fresh ripe fruit, according to M. Bérard, contains about twenty per cent. of solid matter, of which upwards of eleven per cent. is sugar, and five gum,—the remainder being constituted of the malic and pectic acids, albumen, and ligneous fibre. The proportion of sugar is increased in the process of drying; but this matter has not been investigated.

Prunes are laxative, and when taken in the evening are sufficient, with many, to cause the evacuation of the bowels on the following morning. Generally, they are taken stewed, as diet, in cases of costiveness, or in febrile and other diseases in which it is desirable to keep the intestinal canal gently free. The sugar and mucilage, which they contain, render them also nutritious. They are sometimes added to cathartic infusions and decoctions to improve their taste and increase their effect.

The *Pulp of prunes*, PRUNI PULPA, is made by softening the prunes in the vapor of boiling water, and, having separated the stones, beating the remainder in a marble mortar, and pressing it through a hair-sieve. It enters into the composition of the *Confectio Sennæ.*

9. SINA'PIS.—MUSTARD.

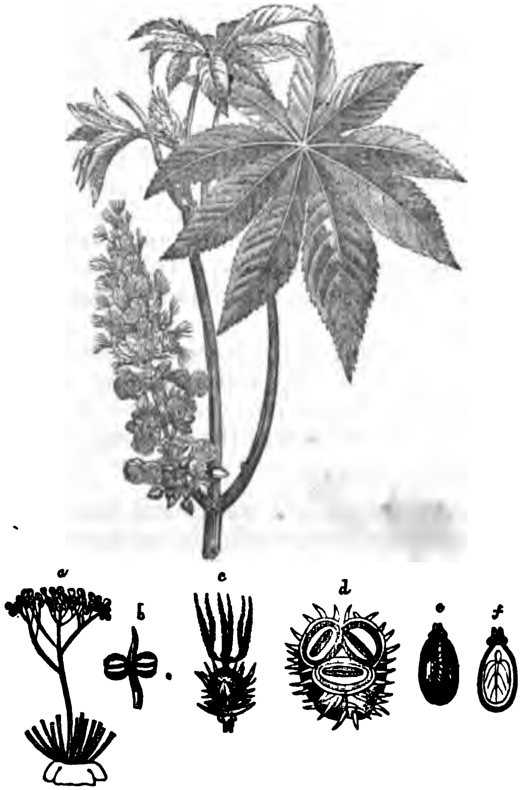
The seeds of *White mustard*, *Sinapis alba*, unbruised, have been long recommended, in the dose of a table-spoonful, in cases of torpor of the digestive function. They had almost fallen into disuse, however, when Sir John Sinclair—the author of a "*Code of Health and Longevity*"—published an article in a periodical, strongly recommending them to the aged as a means of preserving their health, by stimulating the digestive function to greater activity, and at the same time keeping the action of the intestinal canal free. They may be taken three or four times a day, mixed with molasses. It would seem, however, that their use in large quantities, in torpid habits, is not totally devoid of danger. They have been known to accumulate in the cæcum and appendix cæci, and are said to have induced fatal inflammation of the stomach and bowels.

Besides the above officinal laxatives, there are some which are occasionally used as such, but whose prominent effects are of a different nature. These will require a passing notice.

10. O'LEUM AMYG'DALÆ, *Oil of almonds;* and O'LEUM OLI'VÆ, *Olive oil.* The properties of these oils are described elsewhere. Both of them are mild laxatives in the dose of f℥ss to f℥j, although not often used as such. When prescribed, it is generally in affections of the alimentary canal, or of the genito-urinary apparatus, when it may be desirable to give laxatives that will not enter into the blood-vessels, and irritate the kidneys or urinary passages. A common laxative for new-born children, in England, is a mixture of equal parts of *Oil of almonds*, and *Syrup of violets*, or *Syrup of roses*—the dose of which is a teaspoonful; but olive oil and simple syrup are equally effective.

11. INSPISSATED OX-GALL, FEL TAURI INSPISSA'TUM; and INSPISSATED BILE of the SWINE, *Bilis porcina*, have been recommended in torpor of the intestines, where there is presumed to be a deficiency of bile. Dr. Clay, of Manchester, England, does not, however, regard ox-gall as a cathartic; but as a direct solvent of the accumulated hardened fæcal mass, the consequence of deficiency in quality or quantity of bile in the alimentary canal; an explanation, which may admit of question.

Fig. 17.



Ricinus Communis.
a. Stamens. *b.* Anther. *c.* Stigmas. *d.* Capsule. *e.* Seed. *f.* Embryo.

II. *Purgatives or Brisk Cathartics.*

12. O'LEUM RIC''INI.—CASTOR OIL.

Castor oil plant, Ricinus communis or *Palma Christi;* SEX. SYST. Monœcia Monadelphia; NAT. ORD. Euphorbiaceæ, is probably a native of the East Indies, Greece, and Africa, whence it was introduced into the West Indies and the American continent. It is now largely cultivated in many parts of the United States. In India, it is said to attain the height of fifteen or twenty feet; but in this country it does not exceed a few feet. The seeds ripen successively in August and September. They are of an oval shape, somewhat compressed, and about the size of a small bean. Externally, they are smooth and shining, and of a pale gray color, marbled with reddish-brown spots and stripes. In their general appearance, they have been likened to a tick, whence the name *Ricinus*. The husk, which constitutes 24 per cent. of the seed, is chiefly composed of ligneous fibre, with a little gum, resin, and extractive matter. The nucleus or kernel, which has been found to amount to 69 per cent. of the seed when dry, contains 46·2 of fixed oil, 2·4 of gum, 0·5 of soluble albumen and 20 of coagulated albumen. The fixed oil is the *Oleum Ricini.*

The quantity of castor oil used almost exceeds belief. Of 490,558 lbs. imported into England in 1830, 441,267 lbs., according to Mr. M'Culloch, were from the East Indies; 39,408 lbs. from the British Northern Colonies of America; 5139 lbs. from the United States; and 4718 lbs. from the British West Indies. A large proportion of that used to the east of the Alleghanies comes by way of New Orleans from Illinois and the neighboring States, where it is so abundant as to be sometimes burnt in lamps.

The mode in which it is prepared in this country is as follows:—The seeds, being cleansed from all extraneous matters, are put into a shallow iron reservoir, and submitted to a gentle heat, not greater than can be readily borne by the hand; the object of which is, to render the oil sufficiently liquid to be easily expressed. They are then introduced into a powerful screw-press, by which process a whitish oily liquid is obtained, which is transferred to clean iron boilers, supplied with a considerable quantity of water. The mixture is boiled for some time, and the impurities being skimmed off, a clear oil is left on the top of the water, the mucilage and starch being dissolved in the water, and the albumen coagulated. The clear oil is removed, and the process completed by boiling it with a small proportion of water, continuing the application of heat till aqueous vapor ceases to rise, and till a small portion of the liquid, taken out in a vial, is perfectly transparent when it cools. The effect of this last operation is said to be to clarify it, and render it less irritating by driving off the acrid volatile matter. If the heat be carried too far, the oil acquires a brownish hue and an acrid taste, similar to the West India oil. One bushel of good seeds yields five or six quarts, or about 25 per cent. of the best oil. (Wood & Bache.)

The oil, which is obtained by expression without heat, is called *cold-drawn castor-oil.*

Recently prepared castor-oil or *oil*, as it is often called, is inodorous and nearly insipid; colorless, or of a pale straw color; thick, but perfectly transparent. It is lighter than water; grows rancid by keeping; thickens, and its color becomes of a reddish-brown. It has a hot nauseous taste; is completely soluble in absolute alcohol, and in pure sulphuric ether, differing in this respect, from all the ordinary fixed oils, except palm oil. Hence, alcohol is recommended in the Edinburgh Pharmacopœia to test its purity. In this country, however, the oil is so common, that there is no inducement to adulterate it. It has often been examined by the chemist, but the source of its cathartic powers has not been discovered.

Castor-oil seeds are possessed of acrid cathartic properties, and are said to have proved fatal when taken to the extent of twenty at once. The acrid principle is considered to be dissipated by the heat of boiling water; but it is more probable that it exists in the covering of the kernel, inasmuch as the cold-drawn castor-oil does not appear to be more active than that which is prepared by heat. It has been seen, indeed, that long-continued heat developes acridity.

Castor-oil is one of the most valuable of the mild cathartics, operating by virtue of a special affinity for the mucous membrane of the bowels; for when injected into the veins—as was done by a respectable physician of this country (p. 154)—it produced intestinal disorder, and what was more surprising the taste of castor-oil was experienced. It is one of the most speedy in its operation, and, accordingly, is well adapted for all cases in which it is desirable to evacuate rapidly the contents of the bowels. It is apt, however, to induce nausea and vomiting; and this sometimes renders it inapplicable. As elsewhere remarked, its cathartic action is not by any means in a ratio with the dose; hence, in cases in which it is merely desired to evacuate gently the bowels, a teaspoonful or two will often operate as effectually as a larger quantity, and, of course, with less probability of exciting nausea. The author is constantly in the habit of giving it in teaspoonful doses, especially where there is erethism of the mucous membrane of the bowels—and the dose is generally sufficient. For children, it is unquestionably one of our most satisfactory cathartics, and is in constant use in domestic practice—the only objection being its nauseous taste.

The ordinary dose is considered to be a fluidounce, or about two table-spoonfuls; rarely, however, can more than a table-spoonful be needed. For children, the ordinary dose is a teaspoonful. It is so exceedingly disagreeable to many persons, that they can scarcely be prevailed upon to take it; and, under such circumstances, if it reaches the stomach, it is apt to be rejected. As in other cases, however, if the dose be repeated immediately, it may be retained. To obviate this unpleasant taste, it may be dropped on a little aromatic water, spirit and water, hot coffee, or hot milk, and the mouth may be rinsed with some of the vehicle before it is swallowed. Dr. R. E. Griffith, of Philadelphia, says the most effectual mode of disguising its taste is to mix it with the froth of porter. It is not unfrequently made into an emulsion with the yolk of egg, or mucilage, and some aromatic water. (*Ol. ricini* fʒvj; *vitell. ovi*, vel *mucilag. acac.*, vel *mucilag. tragacanth.* f℥ss; *aquæ menthæ pip.* f℥v.—Dose, a fourth part every two hours until it operates.) Oil of turpentine aids its action materially, but renders it still more disagreeable. Should it be indicated, two drachms may be added to the above mixture. Where nausea and vomiting are anticipated, or intestinal irritation exists at the same time, ten drops of laudanum may be added to the dose of oil.

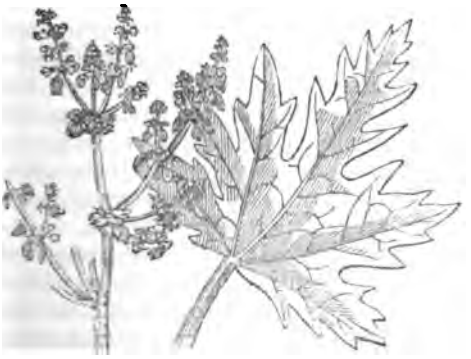
13. RHEUM.—RHUBARB.

Rhubarb is the root of *Rheum palmatum* and other species of Rheum; Sex. Syst. Enneandria Monogynia; Nat. Ord. Polygonaceæ. The botanical history of this drug, long and extensively as it has been known and employed, is still unsettled. Different varieties have been referred to different species of Rheum diffused over the Asiatic continent; yet still its pharmacological history is undetermined.

The chief varieties of rhubarb root met with in commerce are the *Chinese*, *Russian*, and *European*. Dr. Pereira, however, states, that he is acquainted with six kinds—the *Russian*, *Dutch-trimmed*, *Chinese*, *Himalayan*, *English*, and *French*.

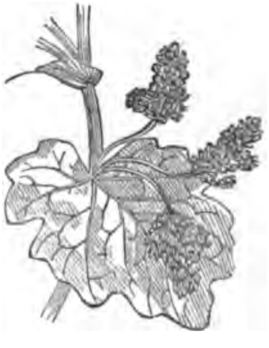
Chinese or East India Rhubarb constitutes the largest portion of that which is used in this country. It is brought either directly from Canton, or by Singapore and other ports of the East Indies. As we meet with it, it is either in round or flattened pieces; seems smooth, as if it had been scraped; and is generally perforated with holes, in many of which are found pieces of the cords by which it had been suspended. It is more heavy and compact than the Russian variety; the smell, too, is much less powerful, and the color of the powder of a more dull yellow or brownish cast.

Fig. 18.



Rheum Palmatum.

Fig. 19.

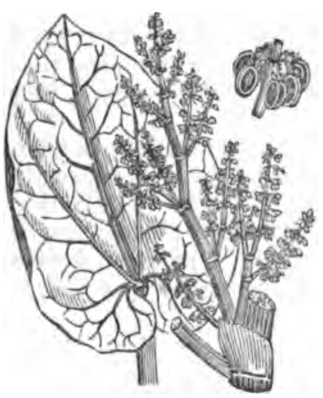


Rheum Compactum.

Russian, Turkey, Moscow, Bucharian, or Siberian Rhubarb, is imported from St. Petersburg; and is said to have been formerly shipped from the Turkish ports, from which it was brought from Tartary by caravans through Persia and Natolia. Hence, it was often called *Turkey Rhubarb*. The Bucharian merchants have entered into a contract with the Russian government to supply it with rhubarb in exchange for furs. It is carried by them to Kiachta, a frontier town, where it is inspected by a Russian apothecary, employed there for the purpose. The worm-eaten portions are rejected, and the others are bored to ascertain their soundness. The portions which do not pass examination are burned; and the rest is sent on to the Russian capital.

The size and shape of the pieces are various—the external appearance seeming to show, that the cortical portion had not been scraped as in the Chinese Rhubarb, but had been cut off longitudinally by the knife; hence the angular appearance of the surface. The smell and taste are essentially those of the Chinese variety, excepting that the latter is somewhat more aromatic. The aroma is, however, so delicate, that, according to Dr. Pereira, in all wholesale drug houses, a pair of gloves is kept in the Russian rhubarb drawer with which to handle the pieces. When chewed, both it and the Chinese variety feel gritty under the teeth, owing to the presence of numerous crystals of oxalate of lime. The color of the powder is a bright yellow, without the orange tinge of the Chinese.

Fig. 20.



Rheum Emodi.

As the Russian is much more expensive than the Chinese variety, the latter is sometimes cut so as to resemble it; but the fraud may be detected by attention. Dr. Wood states, that he has seen parcels of very good rhubarb imported from Canton, which were evidently prepared so as to resemble the Russian; but in most, if not all, of the pieces which came under his notice, the small perforating hole was found, which characterizes the Chinese rhubarb, although in some instances it had been filled with the powdered root so as to conceal it. This was probably the DUTCH-TRIMMED or BATAVIAN RHUBARB, which, according to Dr. Pereira, is imported from Canton and Singapore. Sometimes, the worm-eaten pieces are made to resemble the sound by filling up the holes with a mixture of powdered rhubarb and mucilage, and covering over the surface with the powder; but, by removing this, the fraud is detected.

At times, too, the Eastern varieties are mixed with the European, which is easily distinguishable by its weaker aroma, and want of grittiness when chewed, It is not easy, however, to detect the admixture, if the rhubarb be in a state of powder, and the adulterating article be in small quantity.

EUROPEAN RHUBARB is much inferior to that which is brought from Russia and China. In England two kinds are met with in the shops under the name of ENGLISH RHUBARB;—one *dressed* or *trimmed* so as to resemble the Russian; the other sometimes called *stick rhubarb*. It is raised in various parts of England, but chiefly near Banbury in Oxfordshire; and is distinguished from the Asiatic varieties by being externally of a reddish hue, and having brownish spots of adhering bark; and internally a looser, softer, spongy texture, with occasional cavities, especially in the centre. It is pasty under the pestle. In taste and smell, it resembles Asiatic rhubarb; but is more mucilaginous, and does not, like it, feel gritty under the teeth. *Stick rhubarb* is in irregular pieces, about five or six inches long, and an inch thick. Its taste is astringent, but very mucilaginous. Both varieties of English rhubarb are said to be extensively employed by druggists to adulterate the powder of Asiatic rhubarb. Rhubarb is likewise cultivated largely in France, especially at an establishment called Rheumpole, near the port of Lorient.

The quantity of rhubarb consumed is very great. In the year 1831, according to Mr. McCulloch, there were imported into England from Russia 6901 lbs.; from the East Indies, 133,462 lbs.; of this quantity, 40,124 lbs. were retained for home consumption.

From July, 1848, to April, 1849, inclusive, Dr. Bailey, inspector of drugs at the port of New York, rejected 8456 lbs. of rhubarb root from Canton; 6913 lbs. from London; 545 lbs. from Hamburg; and 1075 lbs. from Marseilles.

The medical virtues of rhubarb are yielded wholly to water and to alcohol. It has been repeatedly subjected to chemical analysis, but the results have not been of much pharmacological interest. They show that it contains a coloring and a bitter principle; with astringent matter consisting of tannic and gallic acids, to which a portion of its medical virtues is referable; gum, woody fibre, oxalate, and phosphate of lime, &c.

Rhubarb is one of the most valuable cathartics, seeming to act upon the whole tract of the intestines, and not causing any very copious secretion from the lining membrane. It is, consequently, one of the mildest of the class. Owing to its containing tannic and gallic acids it is somewhat astringent; and the common opinion is, that it is first an evacuant of the bowels, and afterwards an astringent. Its bitter principle, too, gives it tonic properties: and hence, it is prescribed in small doses, whenever a joint tonic and laxative agency is needed. Like many other cathartics, its operation is often accompanied by tormina, which may be obviated by the addition of some aromatic.

Associated with other cathartics, rhubarb forms one of the most common prescriptions of the physician. It is often given, especially in infancy, combined with magnesia or carbonate of magnesia, which is said to remove the constipating influence that rhubarb, given alone, exerts after it has acted on the bowels. United with the mild chloride of mercury, and an appropriate corrigent, it is an active cathartic, and one very commonly prescribed. (*Pulv. rhei* gr. xv; *hydrarg. chlorid. mit.; pulv. zingib.* āā gr. v.—M.) By roasting, its cathartic power is diminished; and its astringency, it has been supposed, increased; hence, it is not unfrequently employed in diarrhœa and dysentery.

The dose, to produce a full operation, is from twenty to thirty grains; in smaller doses, it is laxative. The European varieties require to be given in twice the quantity. Its nauseous and bitter taste, according to Dr. A. T. Thomson, is completely covered when mixed with milk, if the mixture be taken directly: but the medicine soon communicates its taste to the milk.

When not given in this form, one of the following officinal preparations may be prescribed:

EXTRAC'TUM RHEI, EXTRACT OF RHUBARB. This extract, and the following, have been admitted into the last edition of the Pharmacopœia of the United States. It is prepared by exhausting *rhubarb*, in coarse powder, by *diluted alcohol*, in a percolator; and evaporating in a water-bath to the proper consistence. When carefully prepared, it has the decided odor of rhubarb; and may be given in solution. The dose is from ten to thirty grains.

EXTRAC'TUM RHEI FLU'IDUM, FLUID EXTRACT OF RHUBARB. This is prepared as follows: *Rhubarb*, in coarse powder, ℥viij; *Sugar* ℥v; *Tincture of Ginger* f℥ss; *Oil of Fennel*, *Oil of Anise*, each four minims; *Diluted Alcohol* Oij, or a sufficient quantity. The rhubarb is exhausted by the diluted alcohol, in a percolator, and, by means of a water-bath, the tincture is reduced to five fluidounces; the sugar is then added, and after it is dissolved, the resulting fluid extract is mixed thoroughly with the tincture of ginger holding the oils in solution. The dose of this, as a cathartic, is about half a fluidrachm; but it has no advantages, to compensate for its more expensive character, over a more simple extemporaneous formula.

INFU'SUM RHEI, INFUSION OF RHUBARB. (*Rhei* cont. ʒj; *Aquæ bullient.* Oss.) The dose of this infusion, as a laxative, is f℥j or f℥ij; but it is rarely given alone. It is commonly used as a vehicle for other cathartics or tonics, or for magnesia when prescribed as an antacid.

PIL'ULÆ RHEI, PILLS OF RHUBARB. (*Rhei* pulv. ʒvj; *sapon.* ʒij; divide in pil. cxx.) Generally taken at bedtime as a laxative. Dose; two or three, repeated on the following morning if necessary.

PIL'ULÆ RHEI COMPOS'ITÆ, COMPOUND PILLS OF RHUBARB. (*Rhei* pulv. ℥j; *Aloës* pulv. ʒvj; *Myrrh.* pulv. ʒss; *Ol. menth. piperit.* fʒss; *Syrup. aurant.* q. s. ut fiant pil. cclx.) The aloes adds to the activity of the rhubarb; but it is not easy to see what can be the effect of the myrrh; the oil of peppermint is a corrigent, which prevents the cathartics from griping. It is a good laxative pill, in the dose of two to four at bedtime.

SYR'UPUS RHEI, SYRUP OF RHUBARB. (*Rhei* contus. ℥ij; *Alcohol.* Oss; *Aquæ* Oiss; *Sacchar.* lb. ij; Exhaust by percolation; evaporate by means of a water-bath to thirteen ounces; add the sugar and form a syrup.) Given in the dose of a teaspoonful or two to infants as a laxative. It is not so frequently administered, however, as the following:—

SYR'UPUS RHEI AROMAT'ICUS, AROMATIC SYRUP OF RHUBARB. (*Rhei* contus. ℥iiss; *Caryophyll.* contus.; *Cinnam.* contus. āā ℥ss; *Myristic.* cont. ʒij; *Alcohol. dilut.* Oij; *Syrup.* Ovj, made into a syrup. It may be prepared also by the process of displacement.—See the *Pharmacopœia of the United States*, 1851.) This is much used in domestic practice, under the name of *spiced syrup of rhubarb*, in the bowel affections of children; especially in those that occur during the summer and autumnal months. The aromatic and the alcohol impart excitant properties to it, and render it carminative and laxative. The dose for an infant is a teaspoonful or two.

TINCTU'RA RHEI, TINCTURE OF RHUBARB. (*Rhei* cont. ℥iij; *Cardam.* cont. ℥ss; *Alcohol. dilut.* Oij. It may be prepared also by the process of displacement.) The cardamoms are added as a corrigent. In the dose of f℥ss to f℥j it proves cathartic. In lesser doses, it is sometimes taken as a stomachic and laxative.

TINCTU'RA RHEI ET ALOËS, TINCTURE OF RHUBARB AND ALOES. (*Rhei* cont. ʒx; *Aloës* pulv. ʒvj; *Cardam.* cont. ℥ss; *Alcohol. dilut.* Oij.) This is the relic of the ancient *Elixir sacrum.* It combines the cathartic virtues of rhubarb and aloes. The dose, as a cathartic, is from f℥ss to f℥j.

TINCTU'RA RHEI ET GENTIA'NÆ, TINCTURE OF RHUBARB AND GENTIAN. (*Rhei* cont. ℥ij; *Gentian.* cont. ℥ss; *Alcohol. dilut.* Oij. It may also be made by the process of displacement.) Combining the tonic virtues of gentian with rhubarb, this tincture is employed as a tonic and laxative, in doses of from fʒi to f℥ss; in larger doses—f℥i to f℥ij—it is purgative.

TINCTU'RA RHEI ET SENNÆ, TINCTURE OF RHUBARB AND SENNA. (*Rhei* cont. ℥j; *Sennæ* ʒij; *Coriandr.* cont.; *Fœnicul.* cont. āā ʒj; *Santal.* rasur. ʒij; *Croci*, *Glycyrrhiz.* āā ʒss; *Uvar passar.* demptis acinis, ℔ss; *Alcohol. dilut.* Oiij.) This polypharmacal production is an imitation of *Warner's Gout Cordial.* The rhubarb and senna are cathartics; the coriander and fennel-seed excitants, and therefore corrigents; the red saunders and saffron are mere coloring matters; the liquorice and raisins communicate sweetness to the tincture. It is an agreeable stomachic and laxative, especially in the flatulence of the gouty, and such as have been addicted to the use of wine or spirituous liquors. The dose is f℥ss to f℥ij.

VINUM RHEI, WINE OF RHUBARB. (*Rhei* contus. ℥ij; *Canellæ* contus. ʒj; *Alcohol. dilut.* f℥ij; *Vini albi* Oj.) Canella is an excitant and corrigent; and the wine is applicable to the same cases as the *Tinctura Rhei.* The dose is from fʒiij to f℥j.

14. AL'OË.—AL'OES.

Aloes is the inspissated juice of the leaves of *Aloë spicata*, and other species of aloe; SEX. SYST. Hexandria Monogynia; NAT. ORD. Liliaceæ. The London Pharmacopœia refers it to Aloë spicata alone; the United States Pharmacopœia, with more propriety, to that as well as to other species. It is generally believed, indeed, that three species furnish the different kinds in the market,—*Aloë spicata*, *A. vulgaris*, and *A. Socotorina;* and it is considered probable, that at least two other species are employed,—*A. Comelini* of Willdenow, and *A. linguæformis* of Thunberg.

The information, which we possess as to the sources of aloes, is still unprecise. Within a few years, the drug has been imported into England from Bombay, Arabia, Socotora, Madagascar, the Cape of Good Hope, the Levant, and the West Indies, and it would seem, that the aloes of British commerce is derived more or less from most, if not all of those places, directly or indirectly.

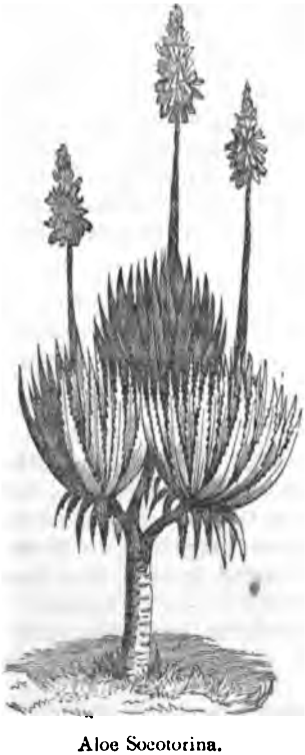
Fig. 21.

Various species of Aloes.

The finest aloes is obtained by inspissating the juice, which flows spontaneously from transverse incisions made in the leaves. If pressure be used, the juice becomes mixed with the mucilaginous liquids of the leaves, and an inferior kind of aloes is the result. A still inferior kind is prepared by boiling the leaves, after the juice has escaped, in water.

In England, no less than seven varieties of aloes are met with—*Socotrine*, *Hepatic*, *Barbadoes*, *Cape*, *Mocha*, *Caballine*, and *Indian*. (Pereira.) In this country, we rarely see more than three, the *Socotrine*, the *Cape of Good Hope*, and the *Hepatic*. (Wood and Bache.)

Fig. 22.



Aloe Socotorina.

SOCOTRINE ALOES ought to be obtained from the Island of Socotora, in the Straits of Babelmandeb, but much that is sold under that name is procured from other places. It would appear that in 1833 the quantity exported from that island was two tons. The epithet Socotrine is often given to the best specimens of aloes, no matter whence obtained. Both in Spain and the West Indies, according to Wood and Bache, the juice, inspissated in the sun, bears this name. It would appear, however, that the commercial value of the real Socotrine aloes is now below that of Barbadoes aloes, than which it is perhaps inferior in activity.

Socotrine aloes is of a yellowish or reddish-brown color, which becomes deepened by exposure to air. The fracture is smooth, glassy, conchoidal; yet even when of excellent quality, it often breaks with a roughish fracture. The powder is of a golden yellow color. The odor of fresh broken pieces, especially when breathed on, is fragrant according to some; it is certainly peculiar, and perhaps, to the mass, not unpleasant. The taste, like that of all aloes, is intensely and enduringly bitter; but perhaps it is somewhat less disagreeable than the other varieties.

Cape of Good Hope Aloes or Cape Aloes is imported into Great Britain, as its name shows, from the Cape of Good Hope, whence it is again imported into the United States. It is the variety chiefly used in this country. It differs materially in its appearance from the Socotrine aloes, having a shining resinous aspect, whence its name *Aloë lucida* with the German pharmacologists. It is of a deep-brown color, approaching to black, and has a glossy or resinous fracture. When held up to the light its edges appear translucent, and have a yellowish-red or ruby color. The powder is of a greenish-yellow color. Its odor is stronger and more disagreeable than that of the preceding variety.

Hepatic or Barbadoes Aloes is imported from Barbadoes or Jamaica in gourds. Its color varies from a dark brown or black to a reddish-brown or liver color. The fracture is sometimes dull; at others, glossy. The powder is of a dull olive-yellow color. The odor, especially when breathed upon, is exceedingly disagreeable and nauseous. It is known that this variety is obtained from *Aloë vulgaris.* It is but little used in this country, except for horses.

A variety of aloes, called Genuine Hepatic Aloes, *Liver-colored Socotrine Aloes*, is exported from Bombay, and would appear to be an inferior variety of the Socotrine. The two are sometimes intermixed.

The composition of aloes has been investigated by many distinguished chemists, Trommsdorff, Bouillon-Lagrange, Vogel, Braconnot, Winkler, and E. Robiquet. It was, for a considerable period, regarded as a gum-resin; but it is questionable whether it contain, strictly, either gum or resin. Its most important constituent is a bitter extractive matter, termed *aloësin,* which, according to Trommsdorff, forms 75 per cent. of Socotrine aloes, and 81·25 of Barbadoes aloes. Some specimens of the latter did not, however, contain more than 52 per cent. There is, in addition to this, a resinoid substance, the proportion of which varies from 6·25 to 42 per cent.—which has been considered oxidized extractive. The most important point, in a pharmacological relation is, that it yields its medical virtues to cold water; a dark-brown substance, however, being left, which is dissolved by boiling water, but is deposited again as the water cools. This is the resinoid substance. Its best solvent is dilute alcohol.

Aloes is more extensively used perhaps than any other vegetable cathartic. It forms the basis of most cathartic pills. Its action appears to be exerted on every portion of the canal, but especially on the large intestines. Even when placed in contact with an abraded surface, it exerts its effect on the bowels; affording an example of that special affinity between particular therapeutical agents, and particular portions of the economy of which we have so many examples. In large doses, it is apt to irritate the rectum; and is therefore improper for those who are suffering under piles, and in pregnancy. When, however, it is associated with hyoscyamus, its injurious agency, in the latter condition especially, is obviated. (*Aloes* pulv.

ʒj; *Ext. hyoscyam.* ℈j.—M. et divide in pilulas xx.—Dose, two at bedtime.)

In its operation, aloes does not stimulate greatly the intestinal glands, and hence the evacuations are not as watery as those produced by many other cathartics. It is rarely, however, given alone; being usually associated with other cathartics, and with some essential oil or other excitant, to prevent the griping which it is apt to occasion. It is affirmed, too, that certain substances, although not possessed of any cathartic property, increase the cathartic action of aloes. Several vegetable bitters, especially sulphate of quinia, and likewise sulphate of iron, have been considered to act in this manner. Dr. Christison states, that he has not been able to detect the property in sulphate of quinia; but that it is undoubtedly possessed by sulphate of iron—one grain of aloes with two or three grains of that salt producing as much effect as two or three grains of aloes alone, and with much less tendency to irritate the rectum. The attention of the author has been drawn to this point, but he is not able to speak so positively as Dr. Christison. It can be understood, however, that any tonic combined with a laxative may have the effect of aiding the operation of the latter by the greater energy it communicates to the digestive operations.

The bitter extractive of aloes renders it at the same time tonic; and hence its usual association with tonics in "dinner pills," when it is advisable to have a joint tonic and laxative influence.

Aloes is rarely given where a speedy action on the canal is needed. Its operation is gradual; and hence, as well as by reason of its exceedingly nauseous taste, it is generally prescribed in the form of pill. Its action is by no means in proportion to the dose; and, accordingly, it may be administered with impunity even to children in very large doses. The author was first induced to employ aloes in such doses by the very high eulogiums he had heard pronounced upon it by Dr. Hamilton, late Professor of Midwifery in the University of Edinburgh, to whom the idea of administering it freely in diseases of children was suggested, by observing, in an apothecary's shop, where he had been placed by his father for the purpose of being practically instructed in Pharmacy, that the *Syrup of Buckthorn*—so called—which they were in the habit of vending to mothers of families, to be given to their children, was usually formed extemporaneously of aloes dissolved in treacle or molasses; and, upon making inquiries of those who had purchased it, he found that no bad effects had resulted from its administration; he consequently formed the determination of trying it in his own practice, when he found it to be not only a successful agent after other means had failed, but, also, that it was rarely rejected by the stomach, acted mildly, was perfectly safe, and but seldom objected to by young infants. The author has elsewhere detailed cases in his own practice, as well as in that of others, in which two drachms of powdered aloes were taken in this form in two successive days, without any griping or unpleasant symptoms, and with full relief to the constipation. (*Commentaries on Diseases of the Stomach and Bowels of Children*, p. 92, Lond. 1824.)

The dose of aloes, as a purgative, is from five to ten grains or more; as a laxative, two or three grains, in the form of pill.

PIL'ULÆ ALOËS, ALOETIC PILLS.—(*Aloës* pulv., *Sapon.*, āā ℥ij. Divide in pil. ccxl.) The soap is added with the view of assisting the solution of the aloes, so as to cause it to act on the whole intestinal tract, rather than on the rectum. Five pills contain ten grains of aloes; so that two at bedtime usually produce a laxative effect on the following day.

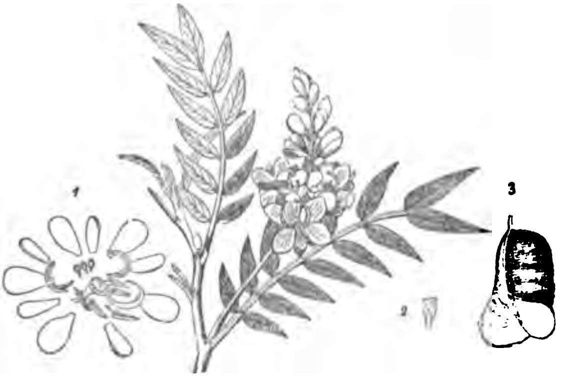
PIL'ULÆ ALOËS ET ASSAFŒ'TIDÆ, PILLS OF ALOES AND ASSAFETIDA.—(*Aloës* pulv., *Assafœtid.*, *Saponis*, āā ℥ss; divide in pilulas clxxx.) The assafetida is added as an excitant; and the pill is given in constipation accompanied by flatulence, and impaired tone of the stomach and intestines. Dose, two to five.

PIL'ULÆ AL'OËS ET MYRRHÆ, PILLS OF ALOES AND MYRRH.—(*Aloës* pulv. ℥ij; *Myrrh.* pulv. ʒj; *Croci* ℥ss; *Syrup.* q. s. ut fiant pil. ccccIxxx.) These are the old *Pilulæ Rufi* or *Rufus's Pills.* They are frequently used by females laboring under catamenial obstruction, which is generally attended by more or less atony and constipation; the myrrh being regarded as an emmenagogue. The dose is from three to six.

PULVIS AL'OËS ET CANEL'LA, POWDER OF ALOES AND CANELLA.—(*Aloës* ℔j; *Canellæ* ℥iij.) This is the old *Hiera picra*, or "*holy bitter*," which has long been much used in domestic practice as an emmenagogue. The canella is excitant, and therefore prevents the griping tendency of the aloes; but, like the last preparation, this is no more emmenagogue than any of the other combinations of aloes; all of which—as elsewhere remarked—affect the uterus only by contiguous sympathy, through their action on the lower part of the intestinal canal.

TINCTU'RA ALOËS, TINCTURE OF ALOES.—(*Aloës* pulv. ʒj; *Glycyrrhiz.* ℥iij; *Alcohol.* Oss; *Aq. destillat.* Oiss.) The same objection applies to the tincture of aloes as to the powder, and indeed to every form of administration except the pill. It is in the highest degree nauseous, and the liquorice renders it scarcely less so. Its dose, as a cathartic, is from f℥ss to f℥iss.

Fig. 23.

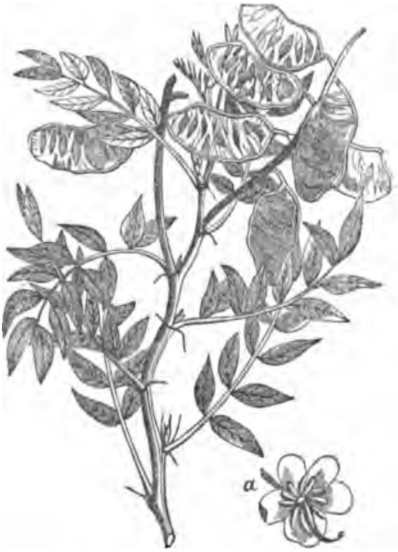


Cassia lanceolata.
1. Separated flowers. 2. Seed. 3. Legume.

TINCTU'RA ALOËS ET MYRRHÆ, TINCTURE OF ALOES AND MYRRH.—(*Aloës* pulv. ℥iij; *Croci* ʒj; *Tinct.*

Myrrh. Oij.) This is a relic of the *Elixir Proprietatis* of Paracelsus. It possesses the same medical properties as the Pilulæ Aloës et Myrrhæ—the saffron being a mere coloring ingredient. Its dose is from f℥j to f℥ij or more.

Fig. 24.



Cassia acutifolia.
a. Detached flower.

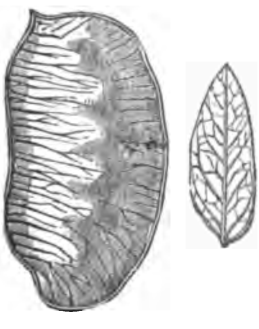
VINUM ALOËS, WINE OF ALOES.—(*Aloës* pulv. ℥j; *Cardam.* cont.; *Zingib.* cont. āā ℥j; *Vini albi* Oj.) Wine of aloes is used in the same cases as the tincture;—the cardamom and ginger acting as corrigents.

Aloes likewise enters into other officinal formulæ, as *Extractum Colocynthidis compositum: Pilulæ Rhei compositæ*, and *Tinctura Benzoini composita* of the Pharmacopœia of the United States—which are described elsewhere.

15. SENNA.

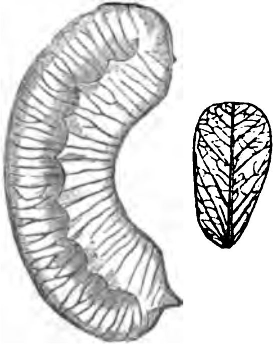
In the Pharmacopœia of the United States, Senna is defined to be "the leaflets of *Cassia acutifolia* (Delile), *Cassia obovata* (De Candolle), and *Cassia elongata* (Lemaire, *Journ. de Pharm.*, vii, 345)." These plants belong, in the Sexual System, to Decandria Monogynia; Nat. Ord. Leguminosæ. Confusion, however, still exists as to the precise species that yield the senna leaves of commerce. *Cassia lanceolata* and *C. Æthiopica* appear to furnish part.

Fig. 25.



Legume and leaflet of Acute-leaved Alexandria Senna.

Fig. 26.



Legume and leaflet of C. obovata. (Pereira.)

The leaflets of *Cassia obovata*, which is a native of Egypt, Nubia, Syria, India, &c., and has been cultivated in Italy, Spain, and the West Indies, are said to form Aleppo, Senegal, and Italic Senna, and to be one of the constituents of Alexandrian senna. Those of *Cassia acutifolia*, which is a native of Egypt, in the valleys of the desert to the south and east of Assouan, are collected by the Arabs, and sold to the merchants, who convey it to Cairo. This is said to be the species that furnishes the Tripoli Senna, and the greater part of the variety, known in commerce under the name of ALEXANDRIAN SENNA. Dr. Pereira, however, refers the Tripoli Senna, which he thinks he has detected in Alexandrian senna, to *Cassia Æthiopica*, which grows in Nubia, Fezzan, to the south of Tripoli, and probably in Ethiopia.

The leaflets of Cassia elongata, which grows in India, are said to yield TINNEVELLY and MECCA SENNAS.

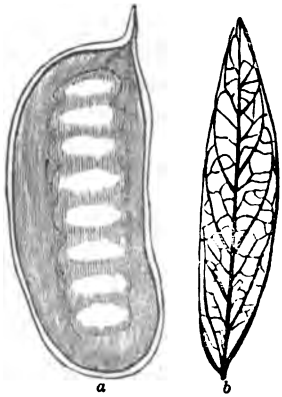
The consumption of senna is considerable. The quantity on which duty was paid in England, in 1838, and 1839, was, according to Dr. Pereira, as follows: from the East Indies, in 1838, 72,576 lbs.; in 1839, 110,409 lbs.; from other places, in 1838, 69,538 lbs.; in 1839, 63,766 lbs. The Mediterranean Senna is brought chiefly to this country from Marseilles; the Indian variety comes either from Bombay or Calcutta—directly, or by the way of London, where it is purchased at the East India Company's sales. (Wood and Bache.)

The varieties that are brought to this country are the *Alexandrian, Tripoli*, and *Indian*.

ALEXANDRIAN SENNA is an admixture of the leaflets of the species of cassia referred to in the Pharmacopœia of the United States. It is sold by compulsion to the Egyptian government, who resell it. It is collected in Nubia and Upper Egypt, and is sent down the Nile to the great depot of Boula, near Cairo. It is of a grayish-green color; of a smell resembling that of tea, and of a viscid taste. It has a broken appearance, and contains various extraneous matters, which are separated from it—when it becomes what is termed *picked Alexandrian senna*.

TRIPOLI SENNA resembles, in appearance, the Alexandrian, than which, it is much cheaper. It is more broken up, however; and, although very active, is less esteemed. It consists of the leaves of *Cassia Æthiopica*, and is carried from Fezzan, where it grows, to Tripoli.

Fig. 27.



Tinnevelly Senna.

a. Legume. *b*. Leaflet. (Royle.)

Of the INDIAN or MOCHA SENNA, there are two varieties: 1, the TINNEVELLY SENNA, or the *finest East Indian Senna*, which is cultivated at Tinnevelly, in the southern part of India. It is a fine unmixed senna, is extensively employed, and brings a good price. It consists of large unbroken leaflets, of a fine green color, from one to two inches or more long, and at times half an inch broad at their widest part. 2. An inferior or second East Indian senna, the MECCA SENNA, or PIKE SENNA, which is cultivated in Arabia, and finds its way to Bombay. It is in long leaflets, narrower than those of Tinnevelly senna, and of a yellowish color, some of the leaflets being brownish or even blackish, and is occasionally mixed with pods, and with stalks and dust. Different adulterations of senna have been pointed out by pharmacological writers, but they do not appear to apply to the sennas of this country, which are generally sufficiently pure. It is proper to remark, however, that Dr. Bailey, inspector of drugs at the port of New York, from July, 1848, to April, 1849, inclusive, rejected 1400 lbs. of senna from Leghorn, and 4894 lbs. from London.

Senna yields its virtues to water—warm or cold; and to alcohol—pure or dilute: hence, water and dilute alcohol are the menstrua employed in officinal preparations. It has, 1, an odorous principle —*volatile oil of senna*—which of course is lost by boiling. This has a nauseous odor and taste; and appears to possess some cathartic power,—the distilled water acting as a mild cathartic:—2, a bitter principle, to which the name *cathartin* has been given. According to Dr. Pereira, three grains of this cause nausea, griping, and purging; but it is denied by Dr. Christison and others, that this is the cathartic constituent.

The active principle is precipitated by infusion of galls, and probably by other astringents, as well as by a solution of subacetate of lead; but these substances can scarcely be combined in the same prescription.

Senna has a special affinity for the lining membrane of the intestines: for its infusion proves cathartic when injected into the veins; and the infant at the breast is purged by it, after the mother has taken it; hence it must have passed into the circulation of the latter. It may, therefore, operate both by direct contact, and indirectly through the circulation. It is a safe, active, and rapid cathartic; hence its value, alone, or associated with other articles, that act speedily, where such action is desirable. The objection to it is its nauseous taste, and tendency to induce vomiting, and especially griping. The corrigents, generally used to obviate these objectionable qualities, are aromatics and saccharine matters, which last have been considered the best of all. They appear, too, to be modified by combining it with certain other cathartics. Like others, too, its purgative effect seems to be increased by combination with a tonic; yet the combination is rarely necessary; and therefore not often made, on account of the disagreeable character of the compound.

Senna is rarely given in powder, partly by reason of the quantity necessary to produce the effect. From ʒss to ʒij is the average dose. Black tea and coffee have been advised to cover its disagreeable flavor.

EXTRAC'TUM SENNÆ FLU'IDUM, FLUID EXTRACT OF SENNA.—This extract, admitted into the last edition of the Pharmacopœia of the United States (1851), is prepared as follows: *Senna*, in coarse powder, ℔ijss; *Sugar* ℥xx; *Oil of Fennel* fʒj; *Compound Spirit of Ether* fʒij; *Diluted Alcohol* Oiv. The senna and diluted alcohol, mixed together, are allowed to stand for twenty-four hours, and are then introduced into a percolator; and water, mixed with one-third of its bulk of alcohol, is gradually poured in, until a gallon and a half of liquid has passed. It is then evaporated by means of a water-bath to f℥xx, and filtered. The sugar is now added; and, when it is dissolved, the compound spirit of ether holding the oil of fennel in solution.

The compound spirit of ether was suggested by a respectable *pharmacien*, of Philadelphia, to prevent fermentation.

The dose of the fluid extract, as a cathartic, is half a fluidounce. It does not strike the author as a preparation possessed of advantages commensurate with the trouble and expense it requires.

INFU'SUM SENNÆ, INFU'SION OF SENNA.—(*Sennæ* ℥ij; *Coriandr.* cont. ℥j; *Aquæ bullient.* Oj.) The coriander is added as a corrigent. *Senna tea* sweetened with sugar is a common domestic remedy, especially as a purgative for children. It is most frequently used as a vehicle for other cathartics, of the saline class especially. The well-known *Haustus niger* or *black draught* or *black dose*—the terror of the invalid, by reason of its nauseous character—is a compound of this nature. It may be made as follows:—*Infus. Sennæ* f℥v; *Aq. cinnam.* f℥j; *Mannæ* ʒiv; *Magnes. sulphat.* ʒvj. Dose, an ounce and a half or more. The dose of *Infusum Sennæ* is f℥iv.

According to Dr. A. T. Thomson, the disagreeable taste of senna is less when the infusion is made with cold water, although it does not lessen the activity of the drug. The taste of the ordinary infusion of senna is covered by the addition of a few grains of cream of tartar, or by admixture with black tea.

TINCTU'RA SENNÆ ET JALA'PÆ, TINCTURE OF SENNA AND JALAP.—(*Sennæ* ℥iij; *Jalap.* pulv. ℥j; *Coriandr.* cont.; *Carui.* cont. āā ʒss; *Cardamom.* cont. ʒij; *Sacchar.* ℥iv; *Alcohol. dilut.* Oiij. It may be made also by the process of displacement.) This is one form of the old *elixir salutis.* The jalap is a cathartic adjuvant; the aromatics, saccharine matter, and the menstruum itself act as corrigents. It is a carminative cathartic, and is employed occasionally, like tincture of rhubarb, in costiveness attended with flatulence, especially in persons of the gouty diathesis. It is more commonly used, however, as an adjunct and adjuvant to infusion of senna. Its dose, as a cathartic, is from f℥ss to f℥j.

SYR'UPUS SENNÆ, SYRUP OF SENNA. (*Sennæ* ℥ij; *Fœnic.* cont. ℥j; *Aquæ bullient.* Oj; *Sacchar.* ℥xv.) The syrup of senna may be added to the infusion, as an adjuvant and corrigent. It is well adapted as a cathartic for children. Dose, fʒj to f℥iij.

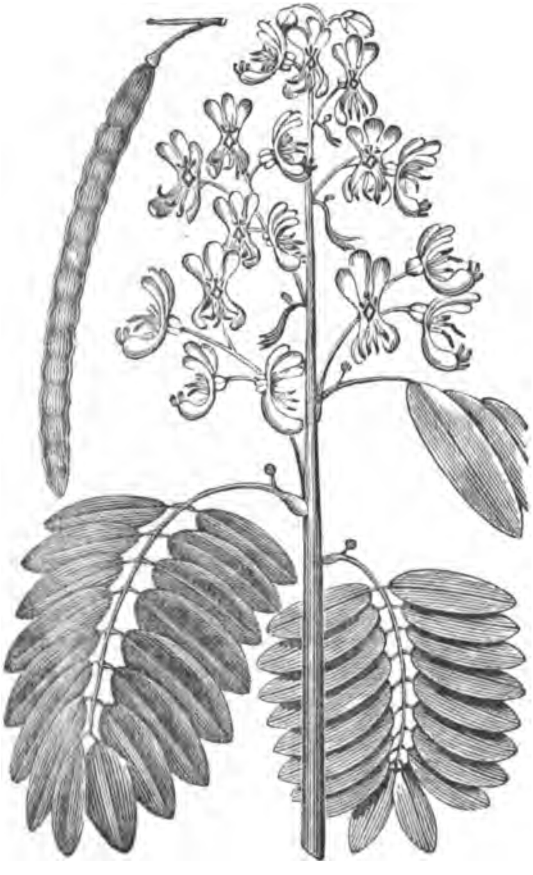
CONFEC'TIO SENNÆ, CONFEC'TION OF SENNA. (*Sennæ* ℥viij; *Coriandr.* ℥iv; *Glycyrrhiz.* cont. ℥iij; *Fic.* ℔j; *Pulp. prun.; Pulp. tamarind.; Pulp. cassiæ fistul.* āā ℔ss; *Sacchar.* ℔iiss; *Aquæ* Oiv. Make into an electuary.) This is one of the forms of the *lenitive electuary*, long used as a laxative, especially by pregnant females, in affections of the rectum, and whenever a gentle effect on the bowels is needed. The coriander and saccharine matters act as corrigents to the senna; whilst the liquorice, figs, prunes, tamarinds, and pulp of cassia are, at the same time, laxative. The dose is from ʒij to ʒiv, taken at bedtime.

Senna likewise enters into other officinal preparations, as *Extractum Spigeliæ et Sennæ fluidum; Syrupus Sarsaparillæ compositus, and Tinctura Rhei et Sennæ*, of the Pharmacopœia of the United States.

16. CAS'SIA MARILAN'DICA.—AMER'ICAN SENNA.

This is an indigenous perennial plant, Sex. Syst. Decandria Monogynia; Nat. Ord. Leguminosæ, from three to six feet high, with flowers of a beautiful golden yellow color, which is very common in every part of the United States to the south of New York, growing most abundantly in flat ground on the margins of rivers and ponds. It is sometimes cultivated in the gardens for medical use. The leaves of *wild senna*—as it is often termed—are collected in August or the beginning of September, and carefully dried. It is in full bloom in the months of July and August.

Fig. 28.



Cassia Marilandica.

In the shops of this country, the leaves are often met with in compressed cakes, prepared by the Shakers. They have a feeble smell, and a disagreeable taste, somewhat resembling that of senna; appear to contain an active principle, similar to the *cathartin* of senna; and yield their virtues to both water and alcohol.

The medical virtues of American senna are similar to those of the imported article; but it is not so active, requiring to be given in a dose about one-third larger. It may be prescribed, like senna, in the form of infusion.

17. JUGLANS.—BUT'TERNUT.

Butternut is the inner bark of the root of *Juglans cinerea*, an indigenous forest tree known not only under the name of butternut, but also of *oilnut*, and *white walnut;* Sex. Syst. Monœcia Polyandria; Nat. Ord. Terebinthaceæ;—Juglandeæ (Lindley). It grows in the Canadas, and in the northern, eastern, and western parts of the United States; flowering in May, and the fruit ripening in September. The inner bark of the root, which is the officinal portion, is collected in May or June.

It is a gentle cathartic, resembling rhubarb in its operation, and was much used in the army of the United States during the revolutionary war. It is rarely, however, prescribed in the cities. It yields its virtues to water, and may be given either in the form of decoction or of extract. The latter is officinal. Juglans itself is rarely or never prescribed in substance.

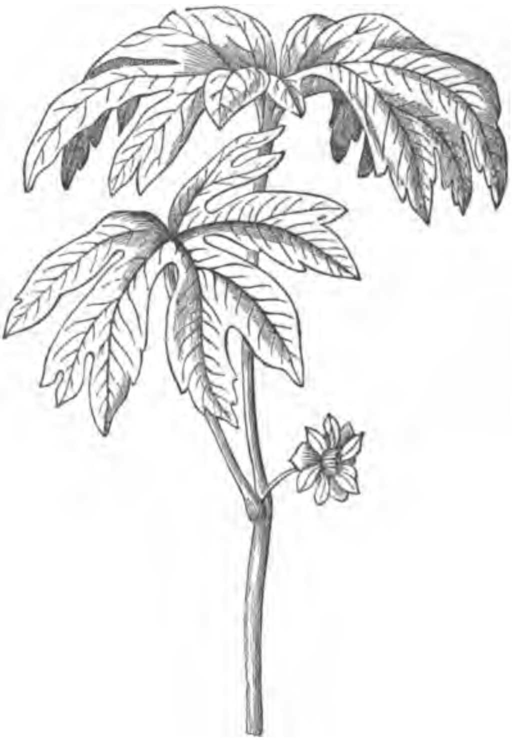
EXTRAC'TUM JUGLAN'DIS, EXTRACT OF BUTTERNUT.—(Prepared by evaporating the decoction of the inner bark of the root in coarse powder, or by the process of displacement.)

The extract often found in the shops is prepared, by the country people, from a decoction of the bark of the branches; and, it is said, even from the branches themselves. This, it has been suggested, may account for the uncertainty of its action. The dose is 20 or 30 grains.

18. PODOPHYL'LUM.—MAY APPLE.

Podophyllum, of the Pharmacopœia of the United States, is the rhizoma of *Podophyllum peltatum;* Sex. Syst. Polyandria Monogynia; Nat. Ord. Ranunculaceæ; — Podophylleæ (*Jussieu*), Berberidaceæ (*Torrey & Gray*); an indigenous herbaceous plant, growing extensively through the U. States, in moist shady places, and low marshy grounds, and commonly known under the name of *May apple* or *Mandrake*. It flowers about the end of May or the beginning of June; and the fruit, which is sometimes preserved, ripens in the latter part of September. The root is collected after the leaves have fallen off. As met with in the shops, it is in pieces about two lines thick, with broad flattened joints at short intervals; is wrinkled longitudinally, and of a reddish or yellowish-

Fig. 29.



Podophyllum Peltatum.

brown color externally. Internally, it is of a whitish color. Its taste is at first sweetish; afterwards bitter, nauseous, and slightly acrid. It yields its virtues both to water and alcohol.

The powdered root resembles jalap in its action, and may be used in the same cases and forms of combination. Its dose is about 20 grains.

EXTRAC'TUM PODOPHYL'LI, EXTRACT OF MAY APPLE.—(This extract is directed to be prepared in the same manner as the *Extractum Jalapæ*, for which it might be substituted.) Its dose as a cathartic is from five to fifteen grains; but neither it nor podophyllum is much used by the profession generally.

19. HYDRAR'GYRI CHLO'RIDUM MITĒ.—MILD CHLORIDE OF MER'CURY.

Mild Chloride or *Subchloride of Mercury*, *Submuriate of Mercury* or *Calomel*, is usually prepared by sublimation. According to the Pharmacopœia of the United States, a sulphate of mercury is first formed by boiling two pounds of *mercury* in three pounds of *sulphuric acid*, until the salt is left dry. This is then rubbed, when cold, with the remainder of the mercury, until they are thoroughly mixed. A pound and a half of *chloride of sodium* is now rubbed with the other ingredients till all the globules disappear. The mild chloride is then sublimed, and afterwards reduced to powder, and washed frequently with boiling distilled water, till the washings afford no precipitate upon the addition of solution of ammonia. If no metallic mercury were added in this process, the sublimate would be corrosive chloride. As prepared in this way, there is always some corrosive chloride mixed with the mild chloride, which is removed by the washing directed in the process. With the same view, and to obtain it in a state of minute division, the mild chloride in vapor is, at times, made to come in contact with steam in the subliming vessel by which it is condensed.

Calomel is also occasionally made by precipitation from a solution of *mercury* in *nitric acid*, as much as possible in the state of protoxide, and adding to it *chloride of sodium*. By this process, it is obtained in a state of very fine division.

When well prepared, the two calomels are essentially alike in therapeutical properties; but the one by sublimation is generally preferred. Neither the one nor the other is made by the apothecary, but by the manufacturing chemist on a large scale. That which is prepared in the ordinary mode by sublimation forms a crystalline cake, the shape of which is dependent upon that of the subliming vessel. The crystals are square prisms. As seen, however, in the shops, it is in fine powder, devoid of taste and smell, and of a light buff color. That which results from the vapor condensed by steam is perfectly white. It is wholly volatilized by heat, and is insoluble in water, alcohol, and ether. By exposure to light it becomes darker colored, and hence ought to be kept in a bottle coated with black paper, or painted black. By the alkalies or alkaline earths, it is immediately blackened, owing to the formation of protoxide of mercury. Should it contain corrosive chloride, when distilled water is boiled with it, a white precipitate will be caused on the addition of ammonia.

Mild chloride of mercury is in much use as a cathartic, and perhaps nowhere more than in the United States. A certain portion of it is, perhaps, converted into the bichloride, which may be the cathartic agent. It is more probable, however, that, by being dissolved in the alkaline chlorides present, it may produce its special action on the lining membrane of the canal. Certainly, the bichloride cannot be substituted for the protochloride as a cathartic; and this, according to M. Mialhe, is owing to its being absorbed immediately from the stomach, so that it can hardly ever reach the intestines; and, moreover, if it were administered in sufficient quantity to act as a cathartic it would prove a fatal poison. M. Mialhe, however, states his conviction, that in every circumstance in which the mild chloride acts the part of a medicinal agent, it owes its virtues to the corrosive chloride formed.

It has been elsewhere remarked, that calomel is one of the cathartics that do not act in a direct ratio with the dose; indeed, it often happens, that whilst three or four grains operate freely, twenty or thirty may exert but little action. In the latter quantity, it has been advised to allay irritability of the stomach or bowels in numerous diseases, and especially in spasmodic cholera, in which it has been prescribed in enormous quantities by some, under the idea that large doses act as a sedative. Yet this sedative influence—if it exist—must be confined within certain limits, otherwise the immense doses occasionally given—amounting even to drachms—ought to be attended with disastrous consequences. It has been already shown, that, according to the idea of Rasori, all cathartics act best in moderate doses; and that when they are given beyond a certain amount they prove sedative rather than cathartic.

Calomel is essentially a cholagogue cathartic, acting upon the upper part of the intestines more especially, and by contiguous sympathy upon the liver; hence its operation is often attended with a copious discharge of bile, which—as already remarked—may be no evidence that the individual is *bilious*, but merely that he has taken a cathartic, which acts upon the lining membrane of the duodenum, and thus augments the biliary secretion. The source of the green stools, *calomel stools*, which succeed to its repeated employment, has been a subject of difference of opinion: they appear to be owing to a modified secretion of the whole glandular and follicular apparatus connected with the intestinal canal, which it certainly excites to greater action.

With many persons—perhaps with most—when taken to the extent of inducing purging, calomel causes more or less nausea, and at times vomiting; and not unfrequently its action is accompanied by griping. Notwithstanding these inconveniences, however, it is an excellent cathartic, especially when taken at night in the form of pill, and followed up by some saline or other cathartic, of more general and speedy action, on the following morning. It is an excellent adjunct to other cathartics; and hence—where there is no special objection to its employment—it is a common and effective ingredient in most active cathartic pills. It is also a very common cathartic for children in consequence of the facility with which it can be administered. The only objection to it is, that in habits which are very impressible to the action of mercury, it is apt to affect the mouth, even when every precaution has been taken; and, in children especially, to induce stomatitis, with fœtor of the breath, increased flow of saliva, troublesome ulcerations, and, in rare cases, sloughing of the gums and cheeks, and even necrosis of the bones of the face. It is proper, however, to remark, that the author has noticed some cases in which these phenomena presented themselves where no mercury had been taken. Still, it must be admitted, that where a disposition exists to such stomatitis, it may be developed by the use of a calomel purge. Particular persons are unusually susceptible to mercury, and have the constitutional phenomena, pointed out elsewhere, induced by a very small quantity of it; and in public practice the author has remarked, that at certain seasons or periods almost every patient in the wards of the hospital could be affected with mercury by the exhibition of a pill of a few grains of calomel, or even of the pilulæ hydrargyri. This disagreeable result is less to be apprehended under the age of two years,—children at that early age resisting the action of mercury, to which they are so susceptible at an after period.

Associated with opium, calomel is a valuable agent in many intestinal affections accompanied with constipation, or in which it is desirable to gently excite the action of the canal, to remove scybala or irritating matters; for example, in various species of colic, and in enteritis after bloodletting,—the opium acting as a sedative in the dose of two or three grains, and the same amount of calomel associated with it, then operating as a cathartic,—and in diarrhœa, dysentery, &c. As a cathartic, calomel is often employed in cases of worms, and appears to act not simply by dislodging the parasites, but by proving, in some measure, anthelmintic.

In Great Britain, the ordinary dose of calomel as a cathartic is from two to five grains; in France it is rarely given to this extent, whilst in this country the average dose may be stated at from five to fifteen grains. As already remarked, its action does not augment in a direct ratio with the dose. On the contrary, the author has instituted numerous experiments in public practice, and has found that, as a general rule, five grains are more certain in their operation than twenty. In all cases, when it does not act upon the bowels, another cathartic should be administered, as its retention may induce the constitutional effects of mercury. Children generally require almost as large a dose as adults, a child of two years of age requiring three to five grains;—their intestinal canals not seeming to be more impressible to the action of this irritant than those of adults.

The United States Pharmacopœia has a form for **PIL'ULÆ HYDRAR'-**

GYRI CHLO'RIDI MITIS, *Pills of mild chloride of mercury*, in which the calomel is made into pills of one grain each by means of gum arabic powder and syrup. Calomel pills are generally, however, made extemporaneously with the same excipients or with confection of roses; and they have the advantage, that they separate more readily in the stomach; whilst those that have been long kept in the shops have been known to pass through the tract of the intestines unchanged.

Mild chloride of mercury is employed in the formation of *Hydrargyri Oxidum Nigrum*, and it is one of the ingredients of the *Pilulæ Catharticæ Compositæ* of the Pharmacopœia of the United States.

20. PIL'ULÆ HYDRAR'GYRI.—MERCU'RIAL PILLS.

Mercurial pills, *blue pills*, are formed by rubbing *mercury* with *confection of roses*, till all the globules disappear; then adding *liquorice powder*, and beating the whole into a mass. In the Pharmacopœias of London and the United States, one grain of mercury is contained in three of the mass,—*blue mass*, as it is called from its color.

Even at the present day, after much attention has been paid to the subject, it is a matter of dispute as to what is the condition of the mercury contained in this preparation, as well as in others where it is divided by friction with substances not apparently adapted for exerting any chemical action upon it, as in *Unguentum Hydrargyri*, and *Hydrargyrum cum Cretâ*. Many distinguished chemists of the day are disposed to regard it as merely in a state of mechanical division. In the absence of chemical proofs, it would be an objection to this view, that metallic mercury is admitted to be wholly without action on the living economy. It has been found, however, that the vapor disengaged from mercury at atmospheric temperatures contains some oxide; and it is affirmed by a distinguished pharmacological writer, Dr. Christison, that, during eight years, he had examined various samples of *Unguentum Hydrargyri*, and had never failed to detect a sensible proportion of oxide in it; and "although the same fact," he adds, "has not yet been proved of the pill and powders of mercury, there is not yet any conclusive evidence to the contrary." Although, therefore, the point is unsettled, it may be esteemed probable, that a portion at least of the divided mercury in *Pilulæ Hydrargyri* has undergone oxidation. It was under the idea, that the metal is in the state of protoxide, that Mr. Donovan proposed, that the protoxide should be introduced into the materia medica. This is **HYDRAR'GYRI OX'IDUM NIGRUM** of the Pharmacopœia of the United States, *Suboxide*, *Ash*, *Gray*, or *Black oxide of mercury*. It is the precipitate thrown down from mild chloride of mercury by means of potassa. It is rarely, however, used internally, and owing to the occasional presence of the peroxide is liable to operate harshly. Under another head, it will be seen, that it is employed externally as a mercurial revellent.

When Pilulæ Hydrargyri are given as a cathartic, the dose may be five grains at night, followed by a draught of senna and sulphate of magnesia, or sulphate of magnesia alone, on the following morning. Of itself, it will rarely act satisfactorily as a cathartic. The practice of administering it, as above mentioned, became common and empirical, greatly owing to the frequent recommendation of it by the late Mr. Abernethy in disorders of the digestive function; and the author has seen many cases in which mischief was produced thereby. A constant repetition of such agents is, indeed, as elsewhere remarked, well adapted for inducing all the characters of bilious affections, which, in the generality of cases, are, in strict pathology, derangements of the stomach and intestines; and it need scarcely be repeated, that too frequent a repetition of cathartics may give rise to the very evils for the fancied removal of which they are administered.

SALINE CATHARTICS.

As the saline cathartics act much alike, they may be classed together. They are generally given much diluted with water. When concentrated they would seem, according to Liebig, to have a physical, as well as a dynamic action. They extract water from the coats of the stomach and thence create thirst. Part of the solution becomes diluted in this way, and is absorbed; but the greater part passes into the intestines, dilutes the solid matters, and acts as a cathartic. Concentrated saline solutions, as before remarked (p. 94, and p. 155), produce endosmose of serum, and M. Poiseuille found, after the use of saline cathartics, a considerable quantity of albumen in the evacuations.

21. MAGNE'SIÆ SULPHAS.—SULPHATE OF MAGNE'SIA.

Sulphate of magnesia is the common *Epsom salts* or *Bitter purging salts*. It is a constituent of sea-water, and of many mineral springs; is found in some soils, at times efflorescing in capillary crystals; and in this country is met with abundantly in many of the caverns on the west of the Alleghany Mountains.

Formerly Epsom salts were prepared exclusively from the Epsom waters by evaporation and crystallization, and the salt is still prepared from the springs of Seidlitz and Seydschütz. In Great Britain it is made either from Dolomite or Magnesian limestone, by converting the carbonate of magnesia into a sulphate; or from the bittern left after the preparation of common salt, from which it is obtained by simple evaporation and crystallization. In Baltimore, it is extensively manufactured from *magnesite*—the siliceous hydrate of magnesia, which abounds in the neighborhood of that city. It contains less lime than dolomite. These works mainly supply the United States. Sulphate of magnesia is always prepared by the manufacturing chemist, and the quantity annually consumed in the formation of magnesia, and as a therapeutical agent, is enormous.

As met with in the shops, it is sufficiently pure for medicinal purposes. It is in small acicular crystals; but by solution, and recrystallization, tolerably large rhombic prisms, often truncated on the obtuse edges, and terminated by two or four converging planes, are obtained. The crystals are colorless, transparent, without smell, but of a bitter, disagreeable taste. The pure sulphate effloresces, but, owing to admixture of chloride of magnesium, it occasionally deliquesces. It dissolves in its own weight of water at 60° Fahr., and three-fourths of its weight of boiling water. It is insoluble in alcohol.

Sulphate of magnesia possesses the characters of the whole class of saline cathartics, acting upon the entire tract of the intestinal canal, and increasing the secretion from the lining membrane, and at the same time the peristaltic action, so that the evacuations are numerous and watery. The great objection to it is its nauseous taste; yet it often remains on the stomach when other cathartics would be rejected. This is especially the case with a mixture of the sulphate of magnesia and the carbonate as in the following form:—*Magnes. sulphat.* ℥vj; *Magnes. carbonat.* ℥ij; *Aquæ menthæ piperit.* f℥iiss. M. Dose, one half, to be repeated if necessary.

Alone or associated with infusion of senna, it is one of the most common cathartics, both with the professional and the unprofessional. Like all the saline cathartics (as elsewhere remarked), it operates best when dissolved in a large quantity of water. The ordinary dose is one ounce; but in cases of constipation it is best to administer a small quantity—as a drachm—every morning until the sensibility of the mucous membrane is developed to the necessary degree, which it generally is sooner or later. The addition of diluted sulphuric acid, or of elixir of vitriol, so as to form a *supersulphate of magnesia*, adapts it as an excellent laxative and local stimulant in cases of hemorrhage from the stomach and intestines. In the dose of an ounce or two, it is prescribed as an adjunct to cathartic enemata.

MOXON'S APERIENT EFFERVESCING MAGNESIA contains tartrate of magnesia in an effervescent form with tartrate of soda and potassa, and sulphate of magnesia. It is used in indigestion, heartburn, &c. Mr. Durand, of Philadelphia, imitates it as follows: Take of *Carbonate of magnesia*, one part; *Sulphate of magnesia, Bicarbonate of soda, Tartrate of soda and potassa, Tartaric acid*, each two parts. The ingredients are dried, reduced to powder, and mixed. The compound is then enclosed in perfectly dry bottles, and sealed over. The dose is a teaspoonful in half a tumblerful of water, drunk in a state of effervescence.

CHLORIDE OF MAGNE'SIUM, OR MURIATE OF MAGNESIA.—MAGNE'SII CHLO'RIDUM, MAGNE'SIÆ MU'RIAS, has been recommended as a saline cathartic by M. Lebert, of Paris. It is said to exert no injurious effect on the stomach; and to produce less inconvenience than most other cathartics. Its purgative action is said to be followed by improvement of the appetite. The mean dose for an adult is an ounce; and half that quantity for one from ten to fourteen years of age.

22. MAGNE'SIÆ CITRAS.—CITRATE OF MAGNE'SIA.

This salt is an agreeable saline cathartic, which has been introduced into the materia medica within the last few years. It is prepared by saturating a solution of citric acid either with magnesia or carbonate of magnesia. Dr. Pereira has found, that a scruple of the crystallized acid of commerce saturates about fourteen grains of either light or heavy carbonate of magnesia.

Neutral citrate of magnesia, prepared either in this way, or by double decomposition from sulphate of magnesia, and citrate of soda, is a white pulverulent insipid salt, soft to the touch, heavier than magnesia, and soluble in water by the aid of a slight excess of acid. The solution has an acidulous taste without anything disagreeable. It is a mild and agreeable aperient in the dose of two or three drachms. The dose as a purgative is one ounce. The most agreeable mode of administration is in solution in water acidulated with citric acid, and flavored with syrup of lemon or orange peel, and it may be taken either in the still or in the effervescing state. Four drachms of crystallized citric acid, and three and a half drachms of common carbonate of magnesia, dissolved in a sufficient quantity of water, yield rather more than an ounce of the solid citrate; so that if to these ingredients either of the syrups mentioned above be added, with the carbonated or mineral water of the shops in the quantity of half a pint, an agreeable preparation is the result, which generally operates kindly.

Different formulæ for its exhibition are given by MM. Rogé Delabarre, Duclou, Garot, V. Garnier, Maury, Cadet Gassicourt, and others; but the effervescent solution, prepared as above, is, perhaps, the most satisfactory. Dr. Pereira has proposed the following: Liquor magne'siæ citra'tis.—Solution of Citrate of Magnesia, *Magnesian lemonade;* (*Acid. citric.* ʒss; *Magnes. carbonat.* ℈j; *Syrup. aurant.* fʒij; *Aquæ destillat.* f℥ij.) These proportions of acid and magnesia are equal to about 44½ grains of crystallized citrate of magnesia, and a slight excess of acid.

Liquor magne'siæ citra'tis efferves'cens.—Effervescing Solution of Citrate of Magnesia, *Effervescing magnesian lemonade.* (*Acid. citric.* ʒss; *Aq. destillat.* f℥j; *Syrup. aurant.* fʒij. M.) To be taken with fʒx of Dinneford's solution of bicarbonate of magnesia in a state of effervescence.

The last edition of the United States Pharmacopœia (1851) has introduced a process for the

LIQUOR MAGNE'SIÆ CITRA'TIS, SOLUTION OF CITRATE OF MAGNESIA.—Take of *Carbonate of magnesia* ʒv; *Citric acid* ʒviiss; *Syrup of citric acid* ℥ij; *Water* a sufficient quantity. Dissolve the citric acid in four fluidounces of water; and add to the solution four drachms of the carbonate of magnesia previously rubbed with three fluidounces of water. When the reaction has ceased, filter the solution into a strong glass bottle, of the capacity of twelve fluidounces, into which the syrup of citric acid has been previously introduced. Rub the remaining carbonate of magnesia with two fluidounces of water, and pour the mixture into the bottle, which must then be tightly corked, and secured with twine. Lastly, shake the mixture occasionally, until it becomes transparent.

This is an extemporaneous prescription; the whole of it forming but one cathartic dose. It does not bear keeping; a white crystalline precipitate being deposited, which was found by Mr. Procter, to consist of one equivalent of citric acid, three of magnesia, and fourteen of water. It is a solution of an acid citrate of magnesia, impregnated with carbonic acid, disengaged from the addition of the last portion of the carbonate of magnesia to the acid citrate in the bottle, and sweetened with syrup.

Owing to its agreeable taste, this solution is much employed. The author has usually found half the quantity act as a laxative, and, should this not be sufficient, it may be repeated. Its operation is, however, at times unsatisfactory, owing to the flatulence, and small watery evacuations it occasions.

23. SODÆ SULPHAS.—SULPHATE OF SODA.

Sulphate of soda, commonly called *Glauber's salts*, is contained in many mineral springs, and is produced artificially in several chemical processes. It is rarely, or never prepared by the apothecary, being manufactured on a very extensive scale by the wholesale chemist. It is made from the salt remaining after the preparation of chlorohydric or muriatic acid; which is sulphate of soda, usually with the addition of free sulphuric acid. To neutralize this, the London College directs carbonate of soda; the Edinburgh College carbonate of lime. The latter is more economical. It would appear, too, that in consequence of the enormous consumption of sulphate of soda in the manufacture of carbonate of soda, the sulphate is sometimes made directly by the addition of sulphuric acid to chloride of sodium. In some of the Northern States, particularly in Massachusetts, a portion of Glauber's salt is procured from sea-water in the winter season. During the prevalence of very cold weather, sulphate of soda, being the least soluble salt that can be formed of the acids and bases present, separates in the form of crystals. (Wood and Bache.)

Sulphate of soda is in colorless crystals, having the same crystalline form as sulphate of magnesia and sulphate of zinc, which it resembles in general appearance. It rapidly effloresces on exposure to the air, and ultimately falls into a white powder. It dissolves in three parts of water at 60°, and in one part at 212°; and is insoluble in alcohol. Its taste is cooling, but bitter and very nauseous, which is the great objection to it as an internal medicine. Owing to its cheapness, it is not subject to adulteration, and as met with in the shops is adapted for all therapeutical purposes.

In its medical properties it is similar to sulphate of magnesia, which has now taken its place. When the author was a pupil, the sulphate of soda, being somewhat cheaper than the sulphate of magnesia, was the common purgative with the people; whilst the latter, being somewhat less disagreeable, was used by the better classes. An ordinary '*dose of salts*' is one ounce: this may be taken dissolved in water, to which a little dilute sulphuric acid, bitartrate of potassa, or lemon-juice has been added; or in mint water, which masks, in some degree, its disagreeable taste.

If in an effloresced state, or dried so that its water of crystallization is expelled, half the quantity will be a sufficient dose.

24. SODÆ ET POTAS'SÆ TARTRAS.—TARTRATE OF POTAS'SA AND SODA.

This salt, formerly called *Seignette's salt*, *Sel de Seignette*, and still not unfrequently termed *Rochelle salt*, is made by neutralizing *bitartrate of potassa* with *carbonate of soda*,—the excess of acid in the bitartrate being saturated by the soda of the carbonate, whilst the carbonic acid is disengaged. It is in colorless, transparent crystals, which are prisms or halves of prisms, presenting six, eight, or ten sides, and the primitive form of which is the right rhombic prism. It effloresces slightly in dry air, and is wholly and readily dissolved in five parts of boiling water. Its taste is saline and slightly bitter. It is not liable to adulteration.

Tartrate of potassa and soda is a mild refrigerant cathartic,—less disagreeable to the taste than the neutral salts generally employed. It is a constituent of *Seidlitz powders*—so called—which consist of a mixture of two drachms of this salt, and two scruples of bicarbonate of soda, put up in a *white* paper; and of thirty-five grains of tartaric acid in a *blue* paper. These are dissolved separately in water, and taken in the state of effervescence. The dose is from ʒss to ℥j.

25. SODÆ PHOSPHAS.—PHOSPHATE OF SODA.

This salt, sometimes called *tasteless purging salt*, is prepared from bone earth. A formula is given in the Pharmacopœia of the United States. In this, *sulphuric acid* is made to act upon *bone ash*, which consists of phosphate of lime united with some carbonate. In this manner, sulphate and superphosphate of lime result; the latter of which remains in solution,—the former being mainly precipitated. *Carbonate of soda* is then added; carbonate of lime is precipitated, and carbonic acid disengaged. The formation of crystals of phosphate of soda is promoted by a slight excess of carbonate of soda.

Phosphate of soda is in colorless transparent crystals, which speedily effloresce on exposure to the air, and are in oblique rhombic prisms. It has a mild saline taste, resembling that of common salt; has an alkaline reaction, and yields a yellow precipitate with nitrate of silver, which is soluble both in nitric acid and ammonia. It dissolves in four times its weight of cold water, and twice its weight of hot; and is almost insoluble in alcohol.

It possesses the same virtues as the other saline cathartics, with this advantage, that its taste is far more agreeable. It may be given in soup or gruel, to which it communicates a taste like that of common salt. It may be administered to children more easily than any other cathartic of the class. By those who have considered it desirable to restore to the blood the saline matter, which it may have lost in spasmodic cholera, the phosphate of soda has been often selected as the saline agent.

The dose, as a cathartic, is from ℥j to ℥ij.

Phosphate of soda is used in the preparation of *ferri phosphas* of the Pharmacopœia of the United States.

26. POTAS'SÆ TARTRAS.—TARTRATE OF POTASSA.

Tartrate of potassa, *soluble tartar*, is made by neutralizing the excess of *acid* in the *bitartrate of potassa* by the addition of a boiling solution of *carbonate of potassa.* The tartaric acid unites with the potassa, and the carbonic acid is disengaged, after which some insoluble tartrate of lime is separated by filtration; and the liquor is evaporated so that the tartrate may crystallize on cooling.

When properly prepared, it is in white crystals, which are somewhat deliquescent, or become moist in damp air; and are entirely soluble in their own weight of water. Its taste is saline, and somewhat bitter: most commonly, it is in a granular state, owing to the solution having been evaporated to dryness.

Tartrate of potassa is a mild cathartic; but is rarely given alone. It is sometimes added to other cathartics, as to infusion of senna, the griping effects of which it is said to correct like saline cathartics in general. It is occasionally administered as a refrigerant laxative in febrile affections. The dose, as a laxative, is a drachm or two; as a purgative, ℥ss to ℥j.

27. POTAS'SÆ BITAR'TRAS.—BITAR'TRATE OF POTAS'SA.

Bitartrate of potassa, *supertartrate* or *acid tartrate of potassa*, *acidulous tartrate of potassa* or *cream of tartar*, is *crude tartar*, *argol* or *impure supertartrate of potassa* purified. Tartar exists in grape juice, but as it is very slightly soluble in alcohol and water, it is deposited when alcohol is produced, and forms an incrustation on the sides of wine casks. This is purified on a large scale, in France, by solution and crystallization; and it is from that country we receive it. The purest salt is obtained, according to Dr. Christison, by dissolving that which has been purified, gradually evaporating the solution, and removing the crust of bitartrate which forms on the surface, and which has given the name *cream of tartar* to the salt.

As met with in the shops, it has either the form of white crystalline crusts, which are gritty under the teeth; or, what is more common, of a fine white powder. It is devoid of smell, but has an acidulous and not disagreeable taste. It is soluble in 90 parts, according to some—60 according to others—of cold water; and in about 15 of boiling water; and is insoluble in alcohol. It is liable to be adulterated by white mineral and other powders; and usually contains from 2 to 5 per cent. of tartrate of lime, which does not, however, interfere much with it in a medical point of view. When pure, it is wholly soluble in boiling water; and if impure, the extraneous matters remain undissolved. Should it be adulterated by either alum or bisulphate of potassa, the fraud will be detected by chloride of barium, which throws down white sulphate of baryta, insoluble in nitric acid.

In small doses, bitartrate of potassa is a gentle laxative; and associated with sulphur, is a common domestic remedy for preserving the health of children in spring and autumn. In larger doses, it acts more powerfully, and is often given along with jalap, senna, and other cathartics to exert a hydragogue effect. When prescribed as an aperient, it may be in the dose of a drachm or two; as a hydragogue cathartic, from half an ounce to an ounce. Molasses is as good a vehicle as any. When associated with sulphate of magnesia, its acidity masks the disagreeable taste of the latter; and a solution, formed of the two, makes an excellent aperient in habitual constipation. (See page 157.)

Bitartrate of potassa is employed in the preparation of *acidum tartaricum*, *antimonii et potassæ tartras*, *ferri et potassæ tartras*, *potassæ tartras*, *pulvis jalapæ compositus*, and *sodæ et potassæ tartras*, of the Pharmacopœia of the United States.

28. POTAS'SÆ SULPHAS.—SULPHATE OF POTAS'SA.

Sulphate of potassa—of old, *sal polychrest* or *salt of many virtues*—is found in both kingdoms of nature; but that which is used as a medicine is prepared artificially. It is made on the large scale from the salt, which remains after the distillation of nitric acid from nitrate of potassa. This has an excess of sulphuric acid, which may be neutralized, as directed by the Dublin College, by carbonate of potassa. The London College ignites the salt in a crucible, until the excess of sulphuric acid is entirely expelled; whilst the Edinburgh College neutralizes it with carbonate of lime. Both these processes are more economical than that of the Dublin College.

As we meet with it, sulphate of potassa has usually the shape of single or double six-sided pyramids. The crystals are of a white color, very hard and permanent in the air; devoid of smell, and of a bitter saline taste. They require sixteen times their weight of water at 60° to dissolve them, and five times their weight of boiling water; and are insoluble in alcohol.

It is a mild cathartic, operating without any unpleasant concomitants; but is rarely employed. As a laxative, it might be given in the dose of 20 or 30 grains; as a purge, in doses of 4 or 5 drachms. It is sometimes, but not often, combined with rhubarb, in dyspeptic cases; and in gastro-intestinal affections of children, which are accompanied with constipation.

It enters into the composition of *pulvis ipecacuanhæ compositus* or *Dover's powder*, not on account of its medical virtues, but because by reason of its hardness it facilitates the division of the opium in the process of grinding or pounding.

Cases have been published, in which large doses of the salt—an ounce and upwards—given as a cathartic, have proved fatal. It would seem that it is constantly employed in France as a domestic remedy by nurses, to diminish or stop the flow of milk in puerperal females; and it is supposed, both in that country and in England, to have the power of inducing abortion. It is very difficult to pulverize; and a portion of its irritating properties may be dependent upon mechanical excitation of the mucous surfaces with which it comes in contact.

POTAS'SÆ BISUL'PHAS, *Bisulph'ate* or *supersulph'ate of potas'sa*, is officinal in the British Pharmacopœias. The London and Edinburgh Colleges direct it to be made by adding sulphuric acid to a solution of the salt that remains after the distillation of nitric acid. It is a white salt; has a very acid taste and reaction, and is soluble in twice its weight of water at 60°.

It may be given in the same cases as sulphate of magnesia with excess of sulphuric acid. Like sulphate of potassa it is laxative, and has the advantage of being more soluble; but cannot always be substituted for it. In cases of want of tone of the digestive organs, accompanied by diminished secretion of acid, the acid acts beneficially as a tonic; and in hemorrhage from the bowels, good may result from the local astringent influence of the acid on the vessels concerned, whilst the salt may carry off the blood that has been effused. It is not, however, much prescribed at the present day, and perhaps not at all on this side of the Atlantic.

29. POTAS'SÆ ACE'TAS.—AC″ETATE OF POTAS'SA.

This salt may be formed by the direct combination of *acetic acid* and *carbonate of potassa;* evaporating and crystallizing. The acid unites with the potassa of the carbonate; and carbonic acid is disengaged.

As met with in the shops, it has a white, foliaceous, satiny appearance; is soapy to the feel; inodorous, and has a strong, saline, warm, and rather acrid taste. It is extremely deliquescent, and therefore requires to be excluded carefully from the air. At 60° Fahr., according to Dr. Pereira, 100 parts dissolve in 102 of water. It is very soluble likewise in alcohol. When pure, it is perfectly neutral, and does not change the color of litmus or turmeric. It is rarely adulterated, and never perhaps so as to interfere with its medicinal use. The Pharmacopœias of London and the United States lay down certain tests of its purity; but the Edinburgh considers them unnecessary.

Acetate of potassa is a mild cathartic; but it has been more celebrated as a diuretic, whence its old name, *sal diureticus.* Owing to its affecting both the intestines and kidneys, it has been prescribed as a cathartic and diuretic in dropsy. To produce the former effect, it should be given in the dose of ʒij to ʒiij.

30. SO'DII CHLO'RIDUM.—CHLORIDE OF SO'DIUM.

Muriate of soda, common salt, is extensively met with in the inorganic kingdom, and in both plants and animals. Its source, however, as an article of commerce, is in the water of salt springs, and in that of the sea. It occurs, too, in mines in various parts of the world. In this country, the chief saline springs are in New York and Virginia,—the salt works at Kanawha, in the latter State, being estimated to have yielded two million bushels of salt in the year 1835. (Wood and Bache.)

Salt, dug from the earth, is sold in the crude state under the name of *rock salt.* It is purified by solution, and crystallization. From sea-water it is made in the same manner, the evaporation being either accomplished spontaneously, or by heat. Sea-water contains about 2·25 per cent. of it. The salt, which is obtained spontaneously, is *bay salt:* it is in large grains. The ordinary salt is procured by artificial evaporation. It is in small, white, irregular grains; and is the form in common use. *Basket salt* is common salt dissolved and recrystallized; and is so called from being often sold in baskets. This and the bay salt are the best qualities.

The crystals of common salt are white cubes; and, when pure, it undergoes no change in the air: as, however, it generally contains more or less chloride of magnesium, it is slightly deliquescent. At 60°, it requires about two and a half times its weight of water to dissolve it; and is scarcely more soluble in boiling water than in cold. It is sparingly soluble in rectified spirit; and scarcely at all so in absolute alcohol.

Chloride of sodium is rarely given as a cathartic, although in large doses it acts not only as such, but as an emetic. It probably aids the action of other cathartic substances contained in mineral waters. It is a very common addition to cathartic enemata. As a cathartic, it operates in the dose of ℥ss to ℥ij. To clysters it is generally added in the quantity of a tablespoonful or two.

According to Sir George Lefevre, in the form of brine in which cucumbers are preserved, it is a popular aperient in Russia. A small watery, seedy cucumber is preserved in salt and water, to which a very small proportion of vinegar, and some leaves of the black currant tree, are added. Thousands of barrels are so prepared annually; and serve as salad for rich and poor, during winter. The liquor, impregnated with the rind of the cucumber and the leaves of the black currant tree, is drunk in doses of a tumblerful, and seldom fails to produce the desired effect.

Chloride of sodium is used in the preparation of *Hydrargyri Chloridum corrosivum*, and *Hydrargyri Chloridum mite*, of the Pharmacopœia of the United States.

31. ALU′MEN.—ALUM.

Although alum is, in small doses, an astringent, and is therefore described under the head of Astringents in this work, it is, in large doses, as has been shown (page 130), emetic; and, in addition, it induces griping, purging, and even inflammation of the lining membrane of the alimentary canal. In Colica Pictonum, it is said to have been more successful than any other remedy; allaying vomiting, flatulence, pain, and opening the bowels with more certainty than any other agent, and often when other powerful remedies have failed. The dose is from ℈j to ʒij, dissolved in some mucilaginous liquid, as gum water, or flax-seed tea, every three or four hours. Dr. Copland associates opium and camphor with it. It is said to have been found successful in other forms of colic, unaccompanied by constipation.

ALU′MEN EXSICCA′TUM, DRIED ALUM, has been given for the same purpose. Dose, five to ten grains or more.

32. MANGANE′SII SULPHAS.—SULPHATE OF MAN′GANESE.

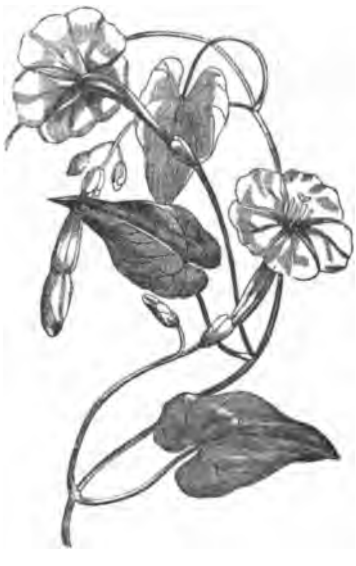
This beautiful rose-colored and very soluble salt, which is isomorphous with sulphate of magnesia, is prepared on a large scale for the use of the dyer. It has been recommended as a cholagogue cathartic. If a drachm, Mr. A. Ure says, be dissolved in about half a pint of water, and swallowed before breakfast, it will generally occasion, after the lapse of an hour or so, one or more liquid stools. Infusion of senna forms a good adjunct in special cases. More recently, Dr. Goolden has confirmed the observations of Mr. Ure. In one case, the immediate effects of the salt were clearly marked in producing a copious flow of bile, which calomel had failed to do.

III. *Drastic Cathartics.*

83. JALA'PA.—JALAP.

Jalap root, the botanical origin of which was long uncertain, is now referred to *Ipomœa jalapa* or *Ipomœa purga;* SEX. SYST. Pentandria Monogynia; NAT. ORD. Convolvulaceæ; a plant which grows on the mountainous land around Chicanquiaco, not far from Xalapa or Jalapa, on the eastern slope of the Andes, at an elevation of about 6000 feet. Xalapa is the only market for the drug, whence it is exported through Vera Cruz. According to Mr. McCulloch, the entries of jalap into England for home consumption, amounted at an average, in 1831 and 1832, to 47,816 pounds a year.

Fig. 30.



Ipomœa purga.

The root of commerce is in roundish or pyriform masses, rarely exceeding a pound in weight, and varying in size from that of the fist to that of a hat. The tubers are often, however, cut into pieces or sliced. They are of a dark-brown color; rough and wrinkled externally; heavy, hard, and pulverizable with difficulty; and—when broken—of a grayish color, with concentric darker circles, in which the matter is denser and harder.

Jalap is liable to be worm-eaten, but it has been found that the insect eats only the amylaceous portion, so that what remains is stronger, weight for weight, than that which had not been touched by it. The powder, in which state it is generally seen in the shops, is of a pale grayish-brown color, and a very disagreeable taste.

The active properties appear to reside in a resinous substance, which exists in the proportion of from 9 to 13·5 per cent.; hence water takes up from it chiefly amylaceous and mucilaginous extractive matter, and little of the cathartic principle, whilst alcohol dissolves the resin.

A light or fusiform Jalap, called in Mexico MALE JALAP, and said to be the produce of *Ipomœa Orizabensis,* is sometimes imported into this country, mixed with the true jalap,—or alone,—and sold for the latter. The genuine drug may be known by the characters above described: whenever it is light, of a whitish color externally, of a dull fracture, and spongy or friable, it ought to be rejected. (Wood and Bache.)

From July, 1848, to April, 1849, inclusive, Dr. Bailey, inspector of drugs at the port of New York, rejected 3756 lbs. of jalap from Tampico; 5217 lbs. from Vera Cruz; and 3550 lbs. from Havana.

Jalap is one of our most common and effective cathartics. It is said to have proved fatal by the violent inflammation it induced in the gastro-enteric mucous membrane; but the author has never met with such a case. It augments the secretion from the lining membrane of the bowels, and, at the same time, greatly increases the peristaltic action; to a less extent, however, than gamboge. It is given in the same cases alone, or associated with other articles where it is desirable to exert a considerable revellent and depletive action on the intestinal canal, as in dropsy, encephalic affections, &c. Whenever, indeed, a brisk cathartic is needed, jalap fulfils the indication. It is apt to excite nausea or tormina; and hence a corrigent, as ginger or some other excitant, is generally added to it; or another cathartic, which may modify its operation. Jalap, associated with mild chloride of mercury, is one of the most common cathartics;—(*Jalap.* pulv. gr. xv; *Hydrarg. chlorid. mit.; Zingib.* pulv. āā gr. v.—M.) The dose of powdered jalap is from fifteen to thirty grains. Its special affinity for the mucous membrane of the bowels is exhibited by the fact, that it purges when applied to a wound. To children, it is sometimes given in cakes of gingerbread, the jalap being incorporated with the paste.

PULVIS JALA'PÆ COMPOS'ITUS, COMPOUND POWDER OF JALAP.—(*Jalap.* pulv. ℥j; *Potass. bitart.* pulv. ℥ij.) The dose of this powder—which is a common hydragogue cathartic prescribed in dropsy, and used whenever an active cathartic is demanded—is from ℈j to ʒj.

TINCTU'RA JALA'PÆ, TINCTURE OF JALAP.—(*Jalap.* pulv. ℥viij; *Alcohol. dilut.* Oij. Prepared either by maceration, or by the process of displacement.) This is not often prescribed alone. It is usually added to cathartic mixtures to quicken their operation. As a purgative, it acts in the dose of fʒij to f℥ss.

EXTRAC'TUM JALA'PÆ, EXTRACT OF JALAP.—(*Jalap.* in pulv. crass. ℔j; *Alcohol,* Oiv; *Aquæ* q. s.—made into an extract by the process of displacement.) The extract may be given in doses of ten grains as a cathartic; but it is rarely used alone. It is an ingredient of the *Pilulæ catharticæ compositæ.*

Jalap-root is one of the bases of *Tinctura Sennæ et Jalapæ* of the Pharmacopœia of the United States.

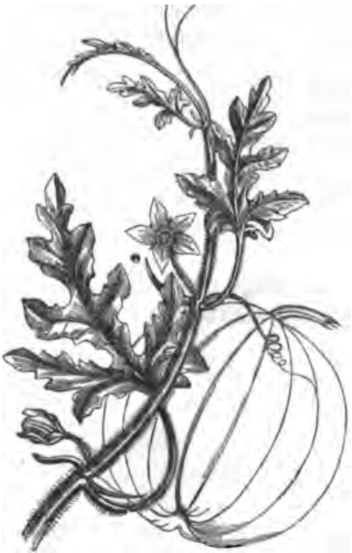
34. COLOCYN'THIS.—COL'OCYNTH.

Colocynth of the shops is the fruit of *Cucumis Colocynthis* or *bitter cucumber;* Sex. Syst. Monœcia Syngenesia; Nat. Ord. Cucurbitaceæ; deprived of its rind. It is a native of Japan, Coromandel, Cape of Good Hope, Syria, Nubia, Egypt, Turkey, and the Islands of the Grecian Archipelago; and is cultivated in Spain, whence it is imported, as well as from the Levant, Mogadore, &c. The quantity on which duty was paid in England, in the year 1839, according to Dr. Pereira, was 10,417 lbs.

The fruit, commonly called *Coloquintida, bitter apple*, is gathered in autumn, when it begins to assume a yellow color, and is peeled and dried quickly, either in the sun or in a stove. It is generally imported into this country peeled, but sometimes unpeeled,—the Turkey colocynth of commerce being usually peeled, the Mogadore unpeeled.—(Pereira.)

Colocynth of the shops is in whitish balls of about the size of a small orange. These are very light and spongy; the seeds, which are inert, constituting three-fourths of their weight. The pulp is the officinal portion. It has not much smell, but its taste is intensely and enduringly bitter and nauseous. It has been subjected to analysis, and found to contain a bitter or purgative principle—*Colocynthin* or *Colocynthite*—which is obtained by digesting the watery extract in alcohol, and evaporating the tincture thus formed. It is a bitter resinoid matter. The pulp is not readily pulverizable. It yields its virtues to water and to alcohol. It would seem, however, that cold water takes up only 16 per cent., whilst boiling water takes up 45 per cent.

Fig. 31.



Cucumis colocynthis.

Colocynth is a powerful irritant to the mucous membrane of the intestines, exciting, in large doses, fatal inflammation, and, as one of the results of its violence of action, occasioning, at times, abortion; hence it has been used to induce criminal abortion, which—like other agents—it never accomplishes except through the violence it does to the system of the mother. Even in small doses, when given alone, its operation is often very harsh; and hence it is usually combined with other articles of the class. It seems to act on every part of the intestinal canal; and, unlike aloes, augments the secretion from the mucous membrane, and thus becomes hydragogue. As such, it is not unfrequently prescribed in dropsy.

The dose of powdered colocynth is from five to ten grains, which must be intimately mixed with powdered gum Arabic or starch; bu it is rarely given in powder. The form of preparation, most com monly prescribed, is the following:

EXTRAC'TUM COLOCYN'THIDIS COMPOS'ITUM, COMPOUND EXTRACT OF COLOCYNTH. (*Colocynth.* ℥vj; *Aloes* pulv. ℥xij; *Scammon.* pulv. ℥iv; *Cardamom.* pulv. ℥j; *Saponis* ℥iij; *Alcohol. dilut.* cong.) The aloes and scammony are added to modify the violent action of the colocynth; the cardamom corrects the griping tendency of the cathartics; and the soap is supposed to aid their solubility. It likewise adds to the consistency of the mass.

Compound extract of colocynth or *cathartic extract* is an excellent and powerful cathartic, forming, like aloes, the basis of many extemporaneous cathartic pills. It is very often associated with the mild chloride of mercury, and forms an excellent cathartic (*Ext. colocynth. comp.* ʒj; *Hydrarg. chlorid. mit.* ℈j.—M. et divide in pil. xx. Dose, two or more, at bedtime.)

The ordinary dose of compound extract of colocynth, as a cathartic, is from five to thirty grains.

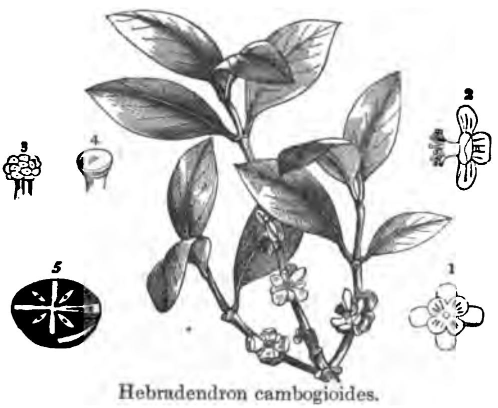
PIL'ULÆ CATHAR'TICÆ COMPOS'ITÆ, COMPOUND CATHARTIC PILLS. (*Ext. colocynth. comp.* pulv. ℥ss; *Extract. jalap.* pulv.; *Hydrarg. chlorid. mit.* āā ʒiij; *Gambog.* pulv. ℈ij.—M.) This combination acts effectively in the dose of three pills.

Forms for cathartic pills might be multiplied almost indefinitely.

85. GAMBO'GIA.—GAMBOGE.

Gamboge or *Camboge*—so well known as a pigment and a drug—is the concrete juice of a tree not yet ascertained. Two kinds of gamboge are described by writers—the *Siam* and the *Ceylon*—but it would seem, that the former only is known in commerce.

Fig. 32.



Hebradendron cambogioides.

1. Calyx. 2. Stamens. 3. Anthers. 4. Top of anther. 5. Berry.

Although uncertainty hangs on the precise tree or trees that furnish gamboge, it has been thought to be obtained from *Hebradendron Cambogioïdes, Cambogia Gutta;* SEX. SYST. Monœcia Monadelphia; NAT. ORD. Guttiferæ; a tree of moderate size, which is a native of Ceylon; and it is inferred, that in Siam it is procured from the same or a congenerous tree.

Three varieties of Siam gamboge are met with in commerce; 1, the *pipe*, so called in consequence of its being in cylinders, often hollow; this is the purest; 2, the *lump* or *cake*, in masses of several pounds weight, containing, generally, fragments of wood, twigs, and air-cells; and 3, the *coarse*, which differs from the other in containing more impurities.

Pure gamboge is devoid of smell, and has not much taste; but after it has remained some time in the mouth, an acrid sensation is experienced in the fauces. The color of its fragments is orange yellow, but when the surface is rubbed with water, it becomes a bright yellow: to produce this color, it is extensively employed as a pigment. It is brittle, and has a smooth glassy conchoidal fracture.

From July, 1848, to April, 1849, inclusive, Dr. Bailey, inspector of drugs, at the port of New York, rejected 1414 lbs. of gamboge from London.

Gamboge has been carefully analyzed by Dr. Christison, who found the composition of the pipe variety, according to two analyses of different samples, to be as follows:—resin, 74·2,—71·6; arabin or soluble gum, 21·8,—24·0; moisture, 4·8 in both instances: total—100·8,—100·4. It contained no trace of volatile oil.

Its effect on the economy is like that of elaterium, than which, however, it is much less active; and, like it, it is used whenever a hydragogue cathartic is needed, as in dropsies, encephalic diseases, &c. Administered to dogs, by MM. Aug. Duméril, Demarquay, and Lecointe, with the view of marking its effect on the function of calorification, the following were the results. Three trials were made with seven, fifteen, and thirty grains. In the first two, the temperature fell 0·3° Centigrade in the one case, and 0·5° in the other. It then gradually rose, and ultimately passed its point of departure, by 0·7° in the former case, and by 1·7° in the latter. In the much larger dose of thirty grains, the depression, in forty minutes, was 1·8°; but reaction soon commenced, the thermometer rose gradually, and, at the end of six hours, was not more than 0·5° below its point of departure.

Gamboge is rarely given alone, but is usually associated with other cathartics, which mutually temper each other's action. Owing to its tendency to induce nausea and vomiting, it should be prescribed in small doses,—from one to three or four grains, in the form of pill repeated every four or five hours. It is one of the ingredients of the *Pilulæ Catharticæ Compositæ* of the Pharmacopœia of the United States. In large doses it is an acrid poison, inducing violent inflammation of the lining membrane of the stomach and bowels; and the deaths, which have followed the use of a celebrated nostrum, *Morrison's Pills*, have been ascribed to it. It has been detected in them.

86. SCAMMO'NIUM.—SCAMM'ONY.

Scammony is the concrete juice of the root of *Convolvulus Scammonia* or *Scammonea;* SEX. SYST. Pentandria Monogynia; NAT. ORD. Convolvulaceæ; a native of Greece and the Levant. It is obtained by cutting the root across near its crown, and sticking shells into it to catch the juice that exudes. The root is very large, generally three or four inches in diameter, and as many feet long; but a single root yields only a few drachms of scammony. The juice is milky as it exudes, and soon concretes under exposure to air, and evaporation.

It is usually exported from Smyrna; occasionally, it goes by way of Trieste, and, still more rarely, is shipped from Alexandria. The finest kind is called VIRGIN or LACRYMA SCAMMONY; other varieties are termed *seconds* and *thirds*. Formerly, it would seem, the term ALEPPO SCAMMONY was applied to the finer, and that of SMYRNA SCAMMONY to the inferior kinds; but no such distinction, it is said, is now known in British commerce. In 1839, the quantity of scammony on which duty was paid in England, amounted, according to Dr. Pereira, to 8551 lbs.

Scammony is said to be so generally adulterated, that it is not easy to fix the characters of the genuine article. It is affirmed, indeed, that there is no article of the Materia Medica, which is sophisticated so often, or which it is so difficult to find pure, even in mere specimens for scientific examination. Dr. Christison remarks, that spurious scammonies are so very common, the pure drug so rare, and the characters of the two qualities so very different, that he has known well-informed retail druggists who could not tell what the pure article was.

The following have been laid down as the characters of good scammony by an accurate and practised observer, Dr. Pereira. It readily fractures between the fingers, or by the pressure of the nail; its specific gravity is about 1·2; its fracture dark, glistening, and resinous; the fractured surface should not effervesce on the addition of chlorohydric acid, which it would do if chalk were present; the decoction of the powder, filtered and cooled, is not rendered blue by tincture of iodine, which it would be if starch were there. One hundred grains incinerated with nitrate of ammonia, yield about three grains of ashes; and sulphuric ether separates at least 78 per cent. of resin (principally) dried at 280° F. Such, too, are essentially the tests of purity laid down in the Edinburgh Pharmacopœia. The following tabular view of various spurious samples of scammony has been given by Dr. Christison.

	Calcareous.			Amylaceous.		Calc. Am.
Resin,	64·6	56·6	43·3	37·0	62·0	42·4
Gum,	6·8	5·0	8·2	9·0	7·2	7·8
Chalk,	17·6	25·0	31·6			18·6
Fecula,		1·4	4·0	20·0	10·4	13·2
Lignin and Sand,	5·2	7·1	7·8	22·2	13·4	9·4
Water,	6·4	5·2	6·4	12·0	7·5	10·4
Total,	100·6	100·3	101·3	100·2	100·5	101·8

Concrete pieces, obtained from various species of convolvulus, and from certain species of the Apocynaceæ, are described by writers, as the MONTPELLIER SCAMMONY, from *Cynanchum Monspeliacum;* the BOURBON SCAMMONY, from *Periploca Mauritiana;* and the GERMANY SCAMMONY, from *Convolvulus Sepium;* but they do not appear to be known in the British or American markets. In the 20th volume of the *American Journal of Pharmacy*, Dr. Carson, of Philadelphia, has well described the varieties of scammony imported into this country. Amongst others, he mentions *gummy* and *black gummy* scammony, in which the chief adulteration appears to be tragacanth, or some similar substance, associated in the dark variety with bone-black. They are in circular cakes, hard, compact, pulverizable with difficulty, and viscid when moistened.

Pure scammony is a gum-resin, containing, however, but a small proportion of gum. According to Dr. Christison, the analysis of two distinct specimens gave 81·8 and 83·0 per cent. of resin; 6·0 and 8·0 of gum; 1·0 and 0·0 of starch; 3·5 and 3·2 of fibre and sand; and 7·7 and 7·2 of water. When pure, it is almost wholly soluble in boiling dilute alcohol; sulphuric ether takes up at least 77 per cent., and even 82 or 83 per cent., if the specimen be tolerably dry. The resin is the cathartic principle, and is separated in the form of *Resina* seu *Extractum Scammonii* of the Edinburgh Pharmacopœia.

Scammony is a drastic cathartic, and applicable to all cases in which medicines of the class are needed. It is so liable to adulteration, however, and so uncertain, withal, in its operation, sometimes acting with great harshness, that it is not much used in this country, and when it is so, it is generally in combination with other cathartics, whose action it augments, whilst its own is mitigated. It is expensive, costing in England, thirty-two shillings, or about seven dollars per pound, wholesale; in this country about three dollars. The ordinary dose is from five to twenty grains. It is occasionally prescribed to children in combination with mild chloride of mercury, and an aromatic excitant to obviate its griping tendency. (*Scammon.* pulv. gr. iv; *Hydrarg. chlorid. mit.* gr. ij; *Zingib.* pulv. gr. iij. M.) It may be made into an emulsion with milk, which diminishes its excitant and irritating qualities.

Scammony enters into the composition of *Extractum Colocynthidis Compositum* of the Pharmacopœia of the United States.

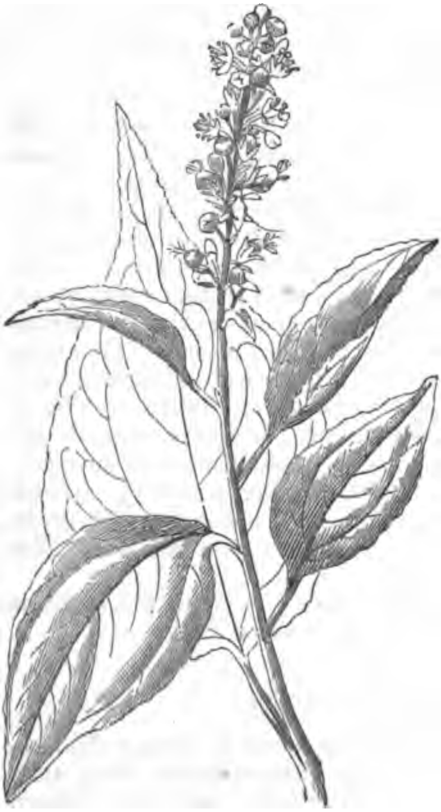
37. O′LEUM TIG′LII.—CROTON OIL.

Croton oil is the expressed oil of the seeds of *Croton Tiglium, Purging Croton:* Sex Syst. Monœcia Monadelphia: Nat. Ord. Euphorbiaceæ, a native of the continent of India, and of the Islands forming the Indian Archipelago and Ceylon. The seeds, formerly called *Grana tiglii, G. tilii, G. Moluccæ,* &c., are, in size and shape, similar to those of the castor-oil plant. The shell is covered with a yellowish epidermis, beneath which the surface is dark brown or blackish. The kernel is of a yellowish-brown color, and forms about 64 per cent. of the seed. The seeds are imported with the view of obtaining the oil from them, of which they yield about 50 per cent. under strong pressure. They have been repeatedly subjected to analysis, but no important pharmaceutical information has accrued from it. The oil is obtained from the seeds in the same manner as Oleum Ricini from the seeds of Ricinus communis. It would seem likewise, to be obtained from the seeds of *Croton Pavana,* a native of Ava; and Dr. Burrough, who was for some time in India, informed Dr. Wood, that much of the oil, prepared there for exportation, is derived from the seeds of a plant entirely different from Croton tiglium. A parcel of these seeds was planted by Dr. R. E. Griffith, who succeeded in raising a plant, which proved to be *Jatropha Curcas,* the seeds of which are known by the name of *Barbadoes Nuts.* This oil is weaker than the real croton oil, but is said by Dr.

Burrough to be an efficient cathartic in the dose of three or four drops.

Croton oil is a thickish fluid, of a honey-yellow color, disagreeable smell, and very acrid taste, exciting inflammation of the tongue and fauces. It has a very acrid matter associated with it, possessing acid qualities—*crotonic acid*—which is identical with the jatrophic. In ether and turpentine it is wholly soluble; in alcohol partially so. It is occasionally adulterated with castor oil. This may be detected by treating it with absolute alcohol, which dissolves the castor oil, and thus lessens the volume of the oil, whilst no perceptible effect is produced on pure croton oil. Of the oil imported into New York, from July, 1848, to April, 1849, inclusive, Dr. Bailey, inspector of drugs at that port, rejected 1104 ounces from London.

Fig. 33.



Croton tiglium.

Croton Seeds, like the seeds of castor-oil plant, are highly acrid and cathartic. In India they are prepared for medical use by being slightly torrefied, by which the shell is more readily separable, and the activity of the acrid property thought to be diminished. Even then, the kernel acts powerfully as a cathartic in the dose of one or two grains.

Croton Oil is a drastic cathartic, very valuable in one respect—that it can be given in small doses. In many cases of great torpor of the intestines, its action has proved very certain. Even a drop commonly produces eight or ten fluid evacuations; but, at times, it has been necessary to give as many as four or five drops in the course of ten or twelve hours. Like most of the drastic cathartics it occasions tormina; but these are less distressing than the burning sensation which it commonly causes in the fauces. Not unfrequently, also, it induces nausea and vomiting. It is one of the most speedy cathartics in its operation; and, being active in a small dose, is adapted for cases in which deglutition is effected with difficulty, or is impracticable,—as in apoplexy, paralysis, &c., in which cases it may be dropped on the tongue. It may likewise be employed when a revellent action on the bowels is needed, or in obstinate constipation where other remedies have failed.

Administered to dogs, by MM. Aug. Duméril, Demarquay, and Lecointe, with the view of marking the effect it had on the function of calorification, the following were the results. In three cases, it was given in the dose of two, six, and twelve drops made into an emulsion with yolk of egg. Each of the first two doses depressed the temperature for the first hour, but it subsequently rose. Thus, two drops were given to a dog, whose temperature was 40·7° Centigrade. An hour afterwards, it had fallen to 40·1°; but in two hours, it had risen to 41·3°; and in six to 42·1°: seven hours after that, the action of the medicine had entirely ceased.

The ordinary dose is stated to be one or two drops; but it will generally operate in smaller quantity than this, even in one-fourth or one half a drop, repeated every hour or two. It is usually given in the form of pill. (*Olei tiglii* gtt. iv; *Micæ panis* q. s. ut ft. pil. viij. Dose, one, two, or more.) It has also been given in the form of *emulsion*, the objection to which is the acrid sensation it induces in the throat. Hufeland recommended it as a substitute for castor oil, advising that a drop of it should be added to an ounce of oil of poppies, and that the mixture should be called *Oleum Ricini officinale.*

A *soap of Croton oil*, composed of two parts of the *oil* to one part of *liquor potassæ*, has been recommended, of which two or three grains prove cathartic. A *tincture of the seeds* has likewise been proposed,—formed of two ounces of the *seeds* from which the rinds have been removed, and one ounce of *alcohol.* This acts as a cathartic in a dose of 20 drops.

Croton oil—as will be seen under another head—is a valuable counter-irritant; and it is affirmed, that a few drops applied externally by friction around the umbilicus have exerted a cathartic effect. In obstinate cases, or where the stomach will not readily receive this or other purgatives, it may be tried in this manner. In another work (*New Remedies*, 7th edit. p. 569, Philad. 1856) the author has given various forms for administering croton oil, many of which, however, are employed by individuals, rather than by the mass of the profession.

38. O'LEUM EUPHOR'BIÆ LATHYR'IDIS.—OIL OF CAPER SPURGE.

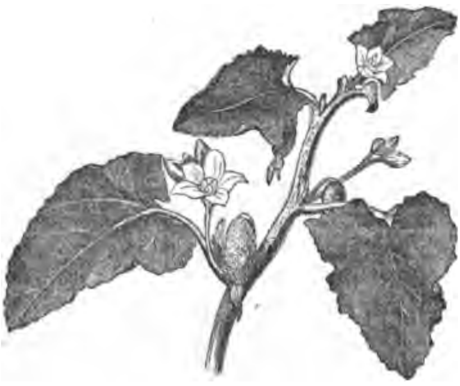
Euphorbia Lathyris, *Garden Spurge*, *Caper Spurge*, *Caper plant*, or *Mole plant;* Sex. Syst. Dodecandria Trigynia; Nat. Ord. Euphorbiaceæ, is indigenous in France. Although not a native of this country, it is sometimes met with in situations where it has the appearance of growing wild. It is easily cultivated, and in some parts of New Jersey is found in abundance. The oil is obtained from the seeds in the same manner as castor oil from castor-oil seeds. It resembles Oleum Ricini in color, but is less dense. It has no odor when newly prepared, and no perceptible taste; but speedily becomes rancid and acquires great acrimony. It is soluble in sulphuric ether; insoluble in alcohol, and forms a soap with alkalies.

About forty or forty-four parts of oil are obtained by expression from one hundred parts of the seeds.

The oil, prepared in Europe, acts as a cathartic in the dose of from four to eight drops, without occasioning tormina or tenesmus, but that obtained from beans raised in this country is not as mild. Even when administered with aromatic oils, and made into a soap with alkalies, it has produced, in numerous instances, nausea and vomiting. It would seem, however, that when given in small quantities, and repeated at intervals of half an hour or an hour, it operates freely as a cathartic without inducing much nausea. It may be given in the form of pill with crumb of bread, or made into an emulsion with mucilage of gum Arabic, sugar, and water.

39. ELATE'RIUM.

Fig. 34.

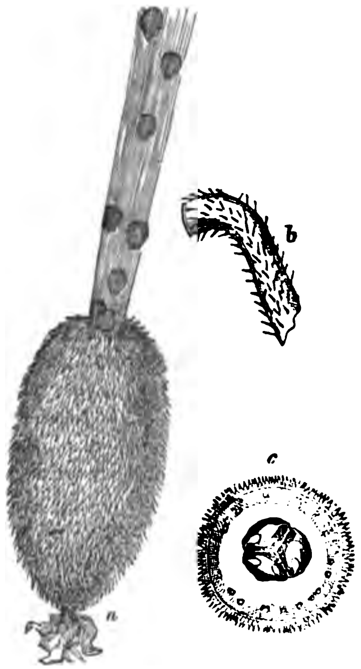


Momordica elaterium.

Elaterium is a substance deposited by the juice of the fruit of *Momordica Elaterium, Wild* or *Squirting Cucumber;* Sex. Syst. Monœcia Syngenesia; Nat. Ord. Cucurbitaceæ, a native of the South of Europe, and common among rubbish in the villages of Greece and the Archipelago. It is cultivated in Great Britain for medical use.

It was found by Dr. Clutterbuck, that the seat of elaterium is entirely in the juice around the seeds obtained without expression. When the cucumber is sliced and placed upon a sieve, a colorless juice flows out, which soon becomes turbid, and in a few hours deposits a sediment. This is the true elaterium, which Dr. Clutterbuck found to purge in the dose of one-eighth of a grain. The quantity obtained in this way is very small, not more than six grains having been got from forty cucumbers. The process recommended in the British Pharmacopœias is to slice ripe wild cucumbers, and strain the juice, very gently expressed, through a very fine hair sieve; it is then set by for some hours, until the thicker part has subsided. The thinner supernatant part being rejected, the thicker is dried with a gentle heat. It would appear, however, that the process, actually followed at Apothecaries' Hall, London, is the following: —The fruits are cut longitudinally in halves by women, and are then placed in a hempen cloth, and put into a screw-press; apparently, a tolerable pressure is applied, but for a few minutes only, being removed before all the juice has ceased to run out. When the fruits are taken out of the press, they are but very slightly crushed, so that the pressure cannot have been great. The juice—as it runs from the press—falls into a hair sieve, through which it flows into a cylindrical-lipped glass jar. Here it is allowed to remain for about two hours, in which time a greenish fecula is deposited. The supernatant liquor is then carefully poured off, and the thicker liquid at the bottom is placed on a paper filter supported by a cloth one stretched on a wooden frame; a bitter, yellowish-brown liquor runs through, and a green mass is left on the filter. The latter is then carefully dried by a stove, and constitutes the *finest elaterium.* The mother liquor which was poured off from the deposit is placed in shallow brown pans, and there lets fall a fresh deposit, which, when separated and dried, forms a *paler elaterium.*

Fig. 35.



Momordica Elaterium.

a. Pepo expelling its seeds; *b.* Stalk; *c.* Transverse section of the pepo. (Pereira.)

Elaterium of commerce appears to consist essentially of the active matter to which the name *elaterin* has been given, with the green coloring matter, cellular tissue, and starch expressed from the fruit, and mixed with the residue obtained by drying the bitter liquor with which the tissues and elaterin were moistened. It is in light, thin, friable cakes or segments, which bear frequently the marks of the muslin or paper on which they were dried. The color is of a pale greenish-gray, which becomes yellowish by exposure. Its taste is acrid and bitter. Some inferior kinds are met with, which are much curled, gummy, and of a brown or olive-green color. They are supposed to be prepared from the juice after the finest elaterium has been separated.

A variety is imported into England from Malta, which is in much larger flakes than the best English elaterium, and has frequently some paper adherent to it on which it was dried. It is not seen, so far as the author knows, in this country.

So active a substance, and one so liable to variation in strength,—not so much from adulteration as from errors in the time of collecting or mode of preparation,—has necessarily attracted to it the attention of the chemical analyst. Dr. Paris found 100 parts to contain 26 per cent. of extractive; 28 of starch; 5 of gluten; 25 of woody matter; 4 of water, and 12 of a green, resinoid and bitter matter, to which he gave the name *Elatin;* and as he ascertained that it possessed all the properties of the elaterium, he considered it to be the active principle. Since then, however, this elatin has been shown to consist of chlorophyll or green coloring matter, with a colorless crystallizable substance, to which the name *Elaterin* has been given.

The following table from Dr. Pereira exhibits the different strength of various specimens of elaterium:

100 parts of Elaterium.	Quantity of Elaterin.
Prepared according to the London College (*Hennell*),	44
Best British Elaterium (*Morries*),	26
Worst do. (*Morries*),	15
French Elaterium (*Morries*),	5 or 6
Elaterium (*Edinburgh Pharmacopœia*),	14·3 to 25
Best specimens (*Balmer*),	33
Fine sample, prepared at Apothecaries' Hall in 1839, and dried by steam heat (*Pereira*),	26

Elaterium, in an over dose, is a violent acrid poison, producing inflammation of the lining membrane of the stomach and bowels. In smaller doses, it is a drastic cathartic, causing a copious secretion from the follicles and exhalants of the intestines, and being the most active of the hydragogue cathartics. On this account it is employed in dropsy; and, where there has been no important lesion of the abdominal viscera, its revellent and depletive influence, exerted in this manner, has succeeded in cases of active dropsy after other remedies had failed. By its revellent action it is likewise well adapted for encephalic affections, such as apoplexy, mania, &c., in which there is usually great torpor of the intestines.

On account of the uncertainty of the strength of the commercial article and the occasional harshness of its operation, it is not much employed; and, when it is, it should be given in divided doses. Half a grain, united with three grains of the extract of gentian as a constituent, may be given every hour or two until it operates. Even in this quantity, it may excite nausea and vomiting. Not unfrequently it acts on the bowels in the dose of one-eighth and even one-sixteenth of a grain, which may be stated as the ordinary dose of good elaterium; yet we rarely meet with it of such strength. Dr. Pereira affirms, that he has repeatedly employed, and seen others employ it, and has always observed, that a quarter of a grain of good elaterium acted very powerfully, sometimes bringing away several pints of fluid; and that half a grain usually occasioned vomiting as well as violent purging.

As the active part of elaterium, *elaterin*, is soluble in rectified spirit, it has been proposed to administer it in the form of tincture, made of one grain of *elaterin*, a fluidounce of *alcohol*, and four drops of *nitric acid*. Between thirty and forty minims seldom fail to act freely.

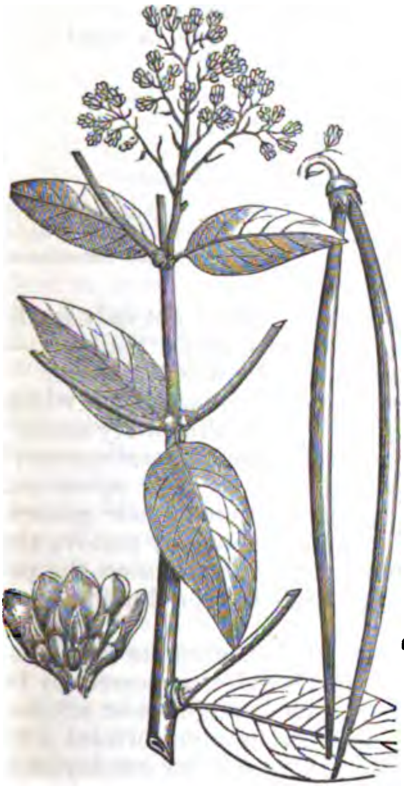
The dose of the elaterium of Clutterbuck is always fixed at one-eighth of a grain; that of the elaterin at one-sixteenth to one-twelfth of a grain.

Some other indigenous articles that act as cathartics have been admitted into the secondary list of the Pharmacopœia of the United States—for example,—

40. Apoc″ynum Cannab′inum, *Indian Hemp* (of the United States); Sex. Syst. Pentandria Digynia; Nat. Ord. Apocynaceæ: the root of

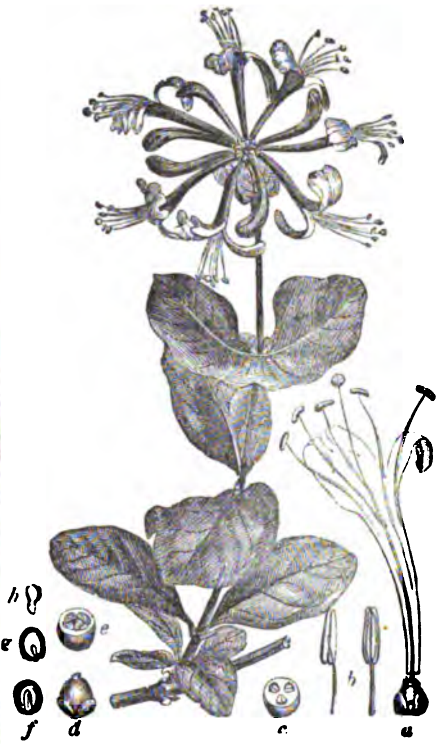
which is officinal, and is powerfully emetic and cathartic. It has been used as a hydragogue cathartic in dropsy. From fifteen to thirty grains of the powdered root generally induce vomiting. It is most commonly given in decoction. (*Apocyn. cannab.* ℥iss; *Aquæ* Oiss; coque ad Oj.—Dose, f℥j to f℥ij.)

Fig. 36.



Apocynum cannabinum.

Fig. 37.



Triosteum perfoliatum.

a. Insertion of stamens. *b.* Anthers. *c.* Section of ovary. *d.* Fruit. *e.* Section of do. *f.* Seed. *g.* Section of do. *h.* Embryo.

41. CONVOL'VULUS PANDURA'TUS, *Wild potato;* SEX. SYST. Pentandria Monogynia; NAT. ORD. Convolvulaceæ; grows in every part of the United States, flowering from June to August. The root, which is the officinal portion, has been proposed as a substitute for jalap, in the dose of forty grains; but it is rarely employed.

42. IRIS VERSIC'OLOR, *Blue flag:* SEX. SYST. Triandria Monogynia; NAT. ORD. Iridaceæ; found in all parts of the United States, flowering in June; the root of which—the officinal portion—has been used as a cathartic; but it is apt to be followed by distressing nausea and prostration. The dose is from twenty to thirty grains; but it is scarcely ever employed.

43. TRIOS'TEUM, *Fever-root.* This is the root of *Triosteum perfoliatum; Fever-root, Feverwort* or *Wild Ipecac.;* SEX. SYST. Pentandria Monogynia; NAT. ORD. Caprifoliaceæ; which is found in most parts of the United States; flowering in June. The root is cathartic; and in large doses emetic. The dose of the bark of the root—the part usually employed—is twenty or thirty grains,—alone, or combined with other cathartics, as calomel.

III. ANTHELMINTICS.

SYNON. *Antithelmintica, Antiscolica, Antiverminosa, Vermifuges.*

Definition of anthelmintics—Experiments on worms, out of the body—Different kinds of anthelmintics—True anthelmintics—Mechanical anthelmintics—Anthelmintics that expel worms by acting on the intestinal canal—Anthelmintics that prevent the formation of worms—Ectozoa—Special anthelmintics.

This class of medicinal agents ought to embrace not only medicines, which prevent the generation of entozoa within the body,—but such as destroy or expel them, when already existing there.

The common definition of anthelmintics is—"remedies which destroy or expel worms situate in any part of the alimentary canal." Drs. Murray and Paris restrict it to "remedies, which expel worms;"—but this is a comparatively unimportant part of their operation. The great object is to get rid of the predisposition to their generation. The anthelmintics that destroy or expel merely remove the parasites already present in the alimentary tube; but, unless the pathological condition that gives occasion to their reproduction is removed, the evil will constantly recur.

Whilst the morbid condition was disregarded, attempts were altogether restricted to the discovery of agents which appeared to be detrimental to entozoic existence, or of such as might most effectually dislodge the parasites; and the number brought forward with such pretensions has been prodigious; yet but few are employed at the present day, and this partly—indeed chiefly—because the main object of the practitioner is properly considered to be to prevent their fresh generation.

Numerous experiments have been instituted on worms, which have been voided,—under the expectation, that some light might, in this way, be thrown on the agents which would probably be most detrimental to them whilst in the body. Redi undertook several experiments on the ascarides lumbricoïdes, of which the following is a partial summary:—in *cold water*, they lived from sixty to seventy hours; in an *infusion of coralline*, more than sixty hours; more than thirty in water rendered bitter by *aloes;* in water saturated with *salt* they died speedily; in *brandy*, still more speedily; in *syrup*—and the experiment was often repeated—within three or four hours. In *wine*, one lived twenty-four, another forty, and a third seventy-four hours.

It has been a question, whether the fatty oils be noxious to worms. They who believe, that, like insects, they are furnished with spiracula, have thought, that, by pouring *oil* upon, or anointing them, the spiracula would become obstructed, and hence the animal would die. Human entozoa are not, however, furnished with spiracula, nor do experiments prove the noxious agency of oils. Coulet affirms, that he found tænia solium live as long in *oil of almonds* as in any other fluid. Arnemann found that human ascarides lumbricoïdes, as well as those of the swine, lived several days in *oil*, when kept in a warm situation. They were in all cases affected with restlessness and contortions; but their bodies became gradually languid and lax; their movements were executed with difficulty, and, as it appeared, painfully; and the skin was contracted into rugæ. In *oil of sweet almonds*, a lumbricus of the hog lived twenty-seven hours; another thirty; human lumbrici, from forty-six to fifty-three. In *oil of bitter almonds*, the lumbrici of the hog lived eighteen, twenty-four, and thirty-nine hours; whilst the human died within thirty-four. In *castor oil*, those of the hog lived fifty-six; the human, from forty-four to forty-eight; the distoma hepaticum, eight. In *linseed oil*, those of the swine from eighteen to twenty; the human from twenty-three to twenty-six. In *oil of walnuts*, those of the swine twenty-two; the human twenty to twenty-five. In *oil of the hazel-nut*, those of the hog, nineteen; the human, twenty-six. In *oil of poppy*, those of the hog, twenty; the human, seventeen, twenty-two, and twenty-seven. In *oil of elder*, those of the hog, twenty-eight; the human, two and three. In *oil of hyoscyamus*, those of the hog, eighteen and twenty-two; the human, twenty-seven. In *oil of beech*, those of the hog, from twenty-nine to thirty-two; the human, forty to forty-six. In *oil of hemp*, those of the hog, sixteen and twenty-three; the human, twenty-seven. In *oil of mustard*, those of the hog, and man, thirty-six. In *rape oil*, those of the hog, twenty-one to twenty-six—the human, twenty-eight; and in *oil of behen* the human lived twenty-six hours.

None of these experiments were as satisfactory as those instituted by Chabert with his *empyreumatic oil*, which consists of one part of the fetid or *empyreumatic oil of hartshorn*, and three of the *essential oil of turpentine*, subjected to distillation. Every kind of worm, immersed in it, was killed either immediately, or after the lapse of a few minutes. The preparations of turpentine are, indeed, amongst the most detrimental to entozoic existence of the substances with which we are acquainted.

Numerous experiments have been made by Dr. Küchenmeister, of Zittau, by immersing living entozoa of fowls, cats, and dogs, in albumen, and adding various anthelmintics in infusion or powder. In some cases, a mixture of warm milk and water was substituted for the albumen. The experiments were not continued longer than from forty to forty-eight hours, if the worm had not been killed before the expiration of that time. The results of his experiments on the tape-worm were as follows: In milk, boiled with *kousso*, it died in half an hour; in a mixture of *oil of turpentine* and albumen, in from an hour to an hour and a quarter; in decoction of *kousso* with albumen, in from an hour and a half to three hours; in decoction of *pomegranate root* in milk, in from three hours to three and a half; in decoction of *pomegranate root* with albumen, in three hours; in *ethereal extract of male fern*, with albumen, in from three and a half to four hours; in *castor oil*, with albumen, and in *salmagundi* with *garlic* and *onions*, in eight hours. These experiments would indicate, that kousso is, of the articles named, most fatal to tænia. Other experiments, instituted on the round worm—Ascarides—seemed to show, that *santonin*, mixed with *castor oil*, is the most destructive to it; and next to this, *chloride of sodium*, the *roe of the herring*, *garlic*, *onions*, &c.

Anthelmintics, according to the definition generally given of them at the present day, may be divided into four classes. *First*,—True anthelmintics. *Secondly*,—Mechanical anthelmintics. *Thirdly*,—Anthelmintics, that expel worms by acting on the intestinal canal. *Fourthly*,—Anthelmintics, that prevent their formation.

1. *True Anthelmintics.*

Of these anthelmintics, that prove destructive to entozoic life by virtue of some principle poisonous to them, which they contain, there are few employed in ordinary practice; yet the lists of the materia medica supply us with a host of such remedies. The preparations of turpentine, especially the oil, united, or not, with the empyreumatic animal oil obtained during the distillation of hartshorn, are decidedly the best; but the improvident employment of these and other excitant agents is liable to induce that debility of the digestive function and of the system, which is the great predisponent of worms. If the proper administration of these remedies fails to destroy the parasites, little dependence can be placed upon others.

It is singular, that M. H. Cloquet should put the *aqueous decoction of hydrargyrum purificatum* at the head of his list of anthelmintics. He observes, also, that he has seen ascarides lumbricoïdes evacuated in a state of torpor, after the abdomen of the patient had been rubbed with a mixture of *ox-gall*, and *common soap*, with *oil of tansy*, or *oil of chamomile*, strongly impregnated with *camphor*, and *garlic;* or with *milk*, holding *aloes* in solution, impregnated with the bitter principle of *colocynth* and *camphor;* or with a maceratum of *bruised garlic* in *camphorated sulphuric ether*. A like effect, he says, is produced by a *plaster* composed of *yellow wax*, *litharge*, *assafetida*, and *galbanum*. He also recommends an application, which is neither the most elegant nor the most easily attainable;—*assafetida* dissolved in the *gastric juice*, "or, what is more simple, in the *saliva!*" Other external applications have been recommended by Laënnec, Barton, &c.; their action, however, may in all cases be explained in one of two ways. The terebinthinate, alliaceous, and other highly odorous agents may be absorbed into the system, and in this way come in contact with the entozoa; but it is not probable, that they can affect them in a state of sufficient concentration to be detrimental. This explanation will not, however, apply to others. There is every reason for believing, that frictions, cataplasms, &c., act as indirect anthelmintics only, by improving the activity of the gastric and intestinal operations, and thus removing the grand predisposition.

2. *Mechanical Anthelmintics.*

Of these, two only are now in general use. In the United States, indeed, neither of them is much employed; but in Great Britain they have by no means outlived favor. They are the *filings of tin* or *granular tin*, and *mucuna* or *cowhage*. The mode in which they act is described hereafter.

3. *Anthelmintics which expel worms by acting on the intestinal canal.*

The substances that operate in this manner belong to the class of cathartics; but they should not be of a violent character, or often repeated, owing to the debility they may induce in the digestive organs. The occasional exhibition of a brisk cathartic is often a valuable agency, not only in removing the worms but in stimulating the gastric function to a more healthy action, and thus removing the predisposition. By exciting, too, the intestines to throw off the retained fæces, and secretions,—in which the worms are often enveloped, and find a nidus favorable for their generation,—they enable those anthelmintics which may be prescribed to come more immediately into contact with the parasites, and should, consequently, be made to precede the use of those remedies. Nor is it alone prior to the administration of anthelmintics that cathartics are useful. When the former have been prescribed for a few days, and there is reason to hope that they have occasioned the death of the worms, a brisk cathartic may be advantageously given for the purpose of removing any accumulation of dead animal matter that may have taken place, and thus of diminishing the tendency to a fresh generation. The cathartics that have been chiefly used for this purpose, are *oleum ricini*, *oleum tiglii*, *gamboge*, *scammony*, *jalap*, *aloes*, and *calomel*,—singly or combined.

4. *Anthelmintics which prevent the formation of worms.*

This class is, after all, the most important. The great predisposition to invermination consists in want of tone generally, and of the gastro-enteric organs in particular. Accordingly, agents that are found to aid chylosis prove most valuable. Charcoal has long had a character for being anthelmintic; and it is well known, that it has been, and is constantly mixed with the food employed for fattening fowls for the markets of large towns. The charcoal contains no soluble matter; but by grating over the mucous membrane of the stomach and intestines, it stimulates the organs concerned in digestion to greater activity, and enables a larger quantity of chyle to be separated from the food taken than could be accomplished without its influence.

Such is the fact, with regard to salt—the *condiment* of *condiments*, *condimentum condimentorum*, as it has been, not inappropriately, termed. Where children are not allowed a proper quantity with their meals, they have been observed to be extremely liable to the generation of these parasites; and therefore a due allowance of salt is to be permitted, and recommended. The agriculturist administers it liberally for the prevention of invermination in his cattle; and it is occasionally given to both animals and man as a true anthelmintic. Fortunately, it is much liked by children, who have apparently a natural taste for it, as is the case with individuals of the animal kingdom,—the buffalo of our own country daily frequenting the *salt licks* of the West; and all our domestic cattle lick it with the greatest delight.

In the twenty-ninth volume of the *London Medical and Physical Journal*, Mr. Marshall has published the case of a lady who had a natural antipathy to salt; and who was dreadfully infested with worms during the whole of her life. In Ireland, according to Dr. Paris, where, from the bad quality of the food, the lower classes are very subject to worms, a draught of salt and water is a popular and efficacious anthelmintic; and Lord Somerville, in an address to the English Board of Agriculture, refers to the effects of a punishment which formerly existed in Holland. "The ancient laws of the country," says his lordship, "ordained men to be kept on bread alone, unmixed with salt, as the severest punishment that could be inflicted upon them in their moist climate. The effect was horrible; these wretched criminals are said to have been devoured by worms engendered in their own stomachs."

Where the practitioner is desirous to destroy worms, the management may have to be somewhat modified by the particular variety; but, the symptoms, that distinguish these from each other, are by no means unequivocal. This is, however, of the less consequence, as all entozoa are induced by the same causes, and more or less affected by the same vermifuges. As the ascarides or oxyures vermiculares occupy the lower part of the bowels, and occasion a troublesome itching within the rectum, their presence may be suspected; and medicines can be introduced to act upon them immediately, by the way of injection,—aided, or not, by anthelmintics administered by the mouth. In all cases, perhaps, it would be better that they should thus be placed between two fires, as it were; as they have been found even in the upper part of the alimentary tube, whence they have been ejected by vomiting; and it is not by any means improbable, that the annoyance occasioned by a clyster might induce them to migrate, for the purpose of seeking quiet in the higher portions of the intestines, or at least of getting rid of the irritation to which they may have been exposed in the lower. In all cases, it will be necessary to investigate the condition of the system, that favors the unusual generation of worms, and to treat it accordingly; but the consideration of this subject belongs more particularly to Special Therapeutics.

SPECIAL ANTHELMINTICS.

I. *True Anthelmintics.*

1. O'LEUM TEREBIN'THINÆ.—OIL OF TUR'PENTINE.

Oil of turpentine—whose general properties are described elsewhere—singly, or combined with other agents, is one of the most powerful of the direct anthelmintics, destroying worms rapidly which may be immersed in it out of the body. It is likewise a cathartic, so that it is rarely necessary to administer any other cathartic afterwards, as is the case with many anthelmintics. Should it not act on the bowels, it may be advisable either to associate castor oil with it, or to follow it up in the course of a few hours by a dose of this oil, inasmuch as when it does not pass off, it may, according to Dr. Copland, by being absorbed, give rise to encephalic mischief, and occasionally to nephritic symptoms. It is applicable to every variety of intestinal worm, and has proved very efficacious in cases of tænia.

It may be given in the dose of fʒij to f℥ss and more, in molasses; or made into an emulsion with the yolk of egg or mucilage.—(*Ol. terebinth.* f℥ss; *Vitell. ovi.* vel *Mucilag. acac.* fʒvj; *Aquæ menthæ piperit.* f℥ss.—M.) Dr. Pereira states, that he has frequently administered f℥iss and sometimes f℥ij, and in no instance has he seen any ill effects from it.

In cases of the oxyures or ascarides vermiculares, oil of turpentine may be made to come in contact with them in the form of enema.

In France the *Oleum Cadinum* or Oil of Cade, *Huile de Cade*, described elsewhere, has been occasionally used in place of it as an anthelmintic.

2. O'LEUM ANIMA'LĒ.—ANIMAL OIL.

Animal oil, *Dippel's oil*, *Oleum animale Dippelii*, is obtained by subjecting animal substances, as bone, to destructive distillation. The commercial article is derived from the manufacture of bone-black, and is identical with *Oleum cornu cervi* or *Oil of Hartshorn* of the older Pharmacopœias. It is thick, brown, viscid, and has a most disgusting odor.

This oil has been highly extolled as an anthelmintic, by the Germans more especially; and it is unquestionably very effective even in cases of tænia; but it is so inexpressibly nauseous, that but few stomachs can retain it. Its virtues have been ascribed to the creasote which it contains; and they are doubtless dependent in part upon that constituent. The dose is ♏v to ♏xx, in molasses, given for three mornings in succession, and followed by a cathartic.

The Empyreumatic Oil of Chabert, Oleum contra Tæniam Chaberti, made—as before remarked—by adding one part of *animal oil* to three parts of *oil of turpentine*, leaving them to combine for four days, and then distilling three parts, has been greatly extolled. It, also, is very nauseous. It combines the anthelmintic virtues of its constituents, and may be given in the dose of a teaspoonful three times a day. It is a very effective vermifuge.

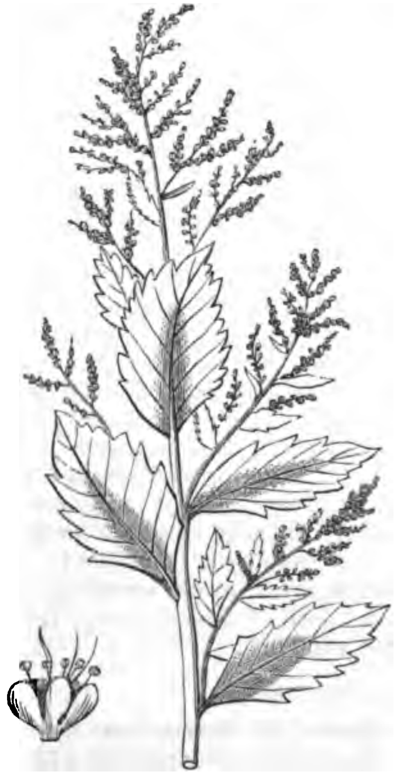
3. CHENOPO'DIUM.—WORMSEED.

Wormseed of the United States is the fruit of *Chenopodium Anthelminticum*, *Jerusalem Oak*; Sex. Syst. Pentandria Digynia; Nat. Ord. Chenopodiaceæ;—the "wormseed" of Europe, being the fruit of *Artemisia Santonica* (Dublin College), or of a variety of *A. Maritima.* Dr. Pereira affirms, that the substance sold in Great Britain under the name of "wormseed"—*Santonici Semen*, *Semen Contra*—does not consist of seeds, but of broken peduncles, mixed with the calyx and flower-buds. It is much used there, in the dose of from ten to thirty grains of the powder, given morning and evening for several days, and followed by a cathartic. A favorite anthelmintic of Bremser, the celebrated helminthologist, is the following, which he prescribed in all cases of intestinal worms:—

℞. Santonic. Semin. (vel Semin. vel Florum Tanaceti) contus. ℥ss.
Valerian pulv. ʒij.
Jalapæ pulv. ʒiss ad ʒij.
Potass. sulphat. ʒiss ad ʒij.
Oxymel. Scillæ, q. s. ut fiat electuarium.
Two or three teaspoonfuls to be taken daily.

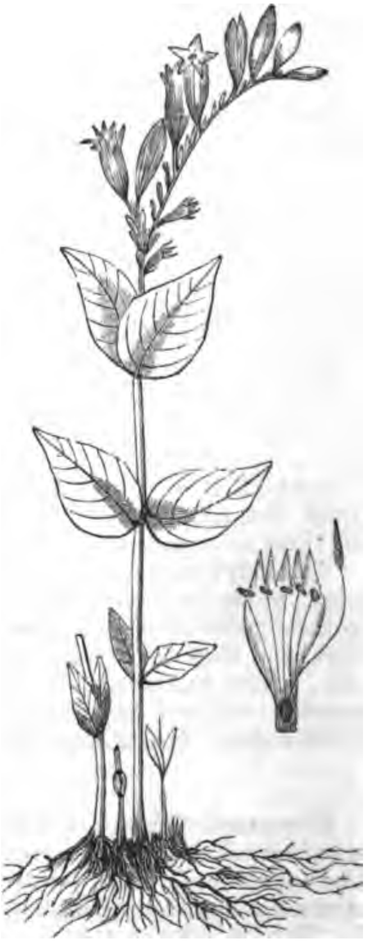
A peculiar bitter principle, called *Santonin*, has been separated from it, which, in the dose of three or four grains, twice a day, has

Fig. 38.



Chenopodium Anthelminticum.

Fig. 39.



Spigelia Marilandica.

been recommended as an efficacious anthelmintic. It has also been used successfully as an antiperiodic in intermittent fevers. As before remarked (p. 224), Küchenmeister found it to be most destructive to the round worms—ascarides. He advises that it should be prescribed mixed with castor oil, in the proportion of from two to five grains to the ounce, a teaspoonful being given at intervals, until the effect is induced. As auxiliary treatment, he recommends chloride of sodium, herring brine, mustard, onions, and garlic.

Chenopodium anthelminticum is an indigenous plant, which grows in almost every part of the United States, but especially in the South,—being found in the vicinity of rubbish, along fences; flowering from July to September; and the seeds ripening in autumn. These are small; roundish; light; of a very bitter peculiar taste, and a disagreeable smell, which is possessed by the whole plant. Their properties are dependent upon a volatile oil separable by distillation with water.

Chenopodium ambrosioïdes, an indigenous plant, is said to be used indiscriminately for it.

Wormseed is one of the most popular anthelmintics in use in the United States; and the common mode of prescribing it, to a child three or four years old, is to mix one or two scruples of the powder with molasses; administering this for three nights in succession, and prescribing a cathartic on the following morning.

O'LEUM CHENOPO'DII, *Oil of Wormseed*, *Wormseed oil*, is officinal in the Pharmacopœia of the United States. It is of a bright yellow color when freshly distilled, but becomes darker by age. It is administered in the same manner as the powder, in the dose of four to eight drops. It may be mixed with sugar or molasses.

4. SPIGE'LIA.—PINKROOT.

Spigelia is the root of *Spigelia Marilandica*, *Indian Pink*, *Carolina Pink*, *Perennial Wormgrass;* SEX. SYST. Pentandria Monogynia; NAT. ORD. Gentianaceæ; Spigeliaceæ (Martius), an indigenous plant of the States south of the Potomac, which grows in rich soils on the edges of woods, and flowers from May to July. It is collected in quantities by the Creeks and Cherokees, by whom it is packed in casks, or more frequently in large bales, weighing from 300 to 350 lbs.; that in the casks being preferred as less likely to be damp and mouldy. (Wood and Bache.)

The dried root, as met with in the shops, consists of numerous, slender, branching, crooked, and wrinkled fibres, issuing from a short rhizoma. These fibres are from three to six inches long. Its odor is faint; taste sweetish and slightly bitter. Its activity has been assigned by Feneulle to a brown, bitter extractive, similar to that of the cathartic Leguminosæ, which, when taken internally, causes vertigo and a kind of intoxication. The virtues of spigelia are imparted to boiling water.

The roots are sometimes mixed with those of a small creeping plant, which twines round the stem. These are much smaller and lighter colored, and should be separated before the spigelia is dried.

Pinkroot is much used in the United States as an anthelmintic; and although cases are related in which it is said to have proved acro-narcotic, and even to have caused death, it is very extensively prescribed, and with entire impunity. Still, it is well to bear in mind, that such cases have been recorded, as well as the statement, that the acro-narcotic effects are less apt to occur when the medicine acts on the bowels, or is combined with cathartics. Dr. Wood affirms, that in the United States it stands at the head of the anthelmintics. It certainly is highly esteemed by many; but others have equal confidence in the chenopodium, and much more in the oil of turpentine and its combinations. It is scarcely used in Great Britain, although it is officinal in the Pharmacopœias of London, Edinburgh, and Dublin.

The dose of the powdered root, for a child a few years old, is from ten to twenty grains, and for an adult, from one to two drachms. This may be given every night, or every night and morning, for three successive days, and then be followed by a brisk cathartic;—or it may be associated with calomel, jalap, or any of the cathartic powders.

EXTRAC'TUM SPIGE'LIÆ ET SENNÆ FLU'IDUM, FLUID EXTRACT OF PINKROOT AND SENNA.—This preparation has been introduced into the last edition of the Pharmacopœia of the United States (1851). It is made by mixing a pound of *spigelia*, in coarse powder, and six ounces of *senna*, in coarse powder, with two pints of *diluted alcohol;* and, having allowed the mixture to stand for two days, transferring it to a percolator, and gradually pouring upon it *diluted alcohol*, until half a gallon of liquid has passed. The liquid is then evaporated, by means of a water-bath, to a pint; and six drachms of *carbonate of potassa* are added; and, after the sediment has dissolved, a pound and a half of sugar, previously triturated with half a drachm of *oil of caraway*, and the same quantity of *oil of anise.*

The carbonate of soda is introduced into the composition, to render soluble the resinous matter deposited during evaporation, as well as to correct the griping property of the senna.

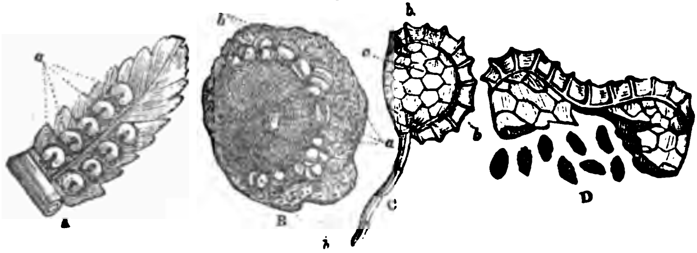
This is a good anthelmintic preparation, which has been much prescribed in this city (Philadelphia); but the two articles may be combined extemporaneously, at less cost, in the way of infusion. The dose is f℥ss; for a child two years old, fʒj.

INFU'SUM SPIGE'LIÆ, INFUSION OF PINKROOT.—(*Spigel.* ℥ss; *Aquæ bullient.* Oj.) The dose of this infusion, for a child a few years old, is fʒss to f℥i; for an adult, f℥iv to f℥viii, given in the same manner as directed for the powdered root; or an equal quantity of senna may be added to the infusion. A preparation is generally kept in the shops, which is said to be much prescribed by physicians under the name of *worm tea.* It consists of pinkroot, senna, manna, and savine, mixed together in various proportions to suit the views of the prescriber. (Wood and Bache.)

5. FILIX MAS.—MALE FERN.

Filix Mas, of the secondary list of the Pharmacopœia of the United States, is the rhizoma of *Aspidium Filix Mas* or *Nephrodium Filix Mas;* Sex. Syst. Cryptogamia Filices; Nat. Ord. Filices; a plant which is indigenous in this country in shady pine forests, from New Jersey to Virginia, as well as in those of Europe, Asia, and Africa. The rhizoma should be collected in the months of July, August, or September. The sound parts are to be carefully dried and reduced to powder. When dried, its odor is weak; taste sweet and mucilaginous, slightly bitter and austere. It is generally brought to this country from Europe.

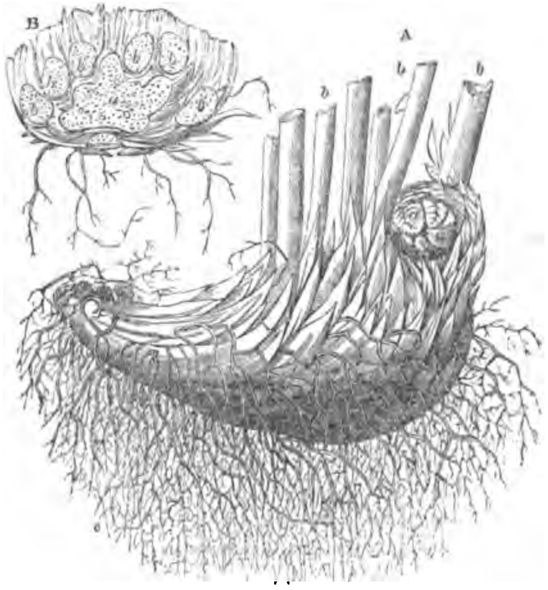
Fig. 40.



Nephrodium Filix Mas.

A. Pinnule with nine sori. (*a*.)
B. Magnified portion of pinnule with sporangia.
a. Stomata. *b*, *b*. Sporangia partially covered by *c*, the indusium.
C. Magnified sporangium.
a. Stalk. *b*. Ring. *c*. Membranous sac.
D. Ruptured Sporangium with the sporule escaping.—(Pereira.)

Fig. 41.



Nephrodium Filix Mas.

A. Fresh rhizome entire. *a*. Spirally-coiled young frond. *b*, *b*, *b*. Leaf stalks (*stipites*) cut off. *c*, *c*. Root-fibres.

B. Transverse section of the fresh rhizome. *a*. Transverse section of the stem, with the vascular bundles. *b*, *b*, *b*, *b*, *b*, *b*. Bases of the leaf-stalks, called *phyllopodia*. They surround the stem in a circular manner, and are devoid of vascular bundles.

As met with in the shops, it consists of fragments of the dried thickened bases of the footstalks, to which small portions of the rhizoma are found adhering, and of the root-fibres. It is recommended, that the stock of the apothecary should be renewed annually, as in two years the best article becomes useless.

Filix mas has been analyzed by various chemists, and it is probable that the anthelmintic virtues reside in volatile oil, which exists in it to the amount of about 7 per cent. It contains, likewise, tannic and gallic acids, which communicate to it its astringent properties.

The root of male fern has been used only as an anthelmintic. It was the basis of Madame Nouffer's celebrated remedy for tænia, which was purchased by Louis XVI, in 1775, for 18,000 francs.

The dose of the powder is one to three drachms, given in molasses, for three nights in succession, and a brisk cathartic on the following morning. The plan adopted,—and successfully, in many cases,—by Madame Nouffer, was to give two or three drachms of the powder in from four to six ounces of water in the morning fasting; and, two hours afterwards, a purgative bolus composed of ten grains of *calomel*, ten of *scammony*, and six or seven of *gamboge*. But the most effective preparation would seem to be that proposed by M. Peschier, of Geneva,—the *ethereal extract*, called, also, OLEUM FILICIS, and EXTRACTUM FILICIS ÆTHEREUM, which contains not only the volatile oil, but also a fixed oil, tannic, gallic, and acetic acids, a muco-saccharine matter, green and red coloring-matter, and a semi-resinous substance. It is made by digesting, in the cold, the root, cut small, for ten or twelve days, in a sufficient quantity of sulphuric ether; after which, the strained liquor is evaporated until the ether is removed. Peschier had known it successful in 150 cases, when he wrote: Ullersberger had used it in sixty cases, and a medical friend of his in 200 cases, with invariable success. It is affirmed to have proved more valuable against *Bothriocephalus latus* than *Tænia solium*; and a part of the discrepancy of results has been ascribed to this cause. For example, it has not been found as effectual in the treatment of tænia at Paris, and the entozoon most common there is Tænia solium.

Farther trials have been made with it, of late years; and, by many observers, as by Professors Christison and J. Hughes Bennett, of Edinburgh, it has been placed above all other tæniafuges. The former says, he is persuaded that it—an indigenous article—is a more efficacious, and less disagreeable anthelmintic for the expulsion of tænia, than "either the Abyssinian kousso, the Continental pomegranate, or American turpentine." (The author's *New Remedies*, 7th edit. p. 389, Philad. 1856.)

The dose of the ethereal extract is from twelve to twenty-four grains. It may be given in the form of pill, or in molasses, for two or three nights in succession, and then be followed by a brisk cathartic.

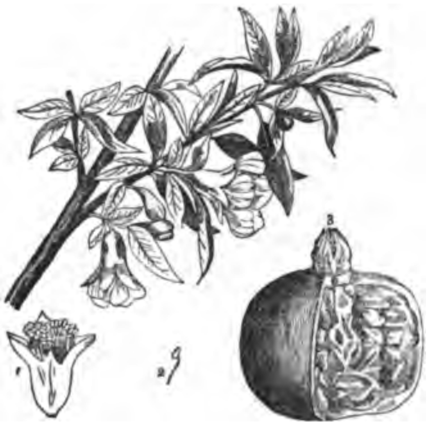
The *Ethereal Tincture of the Buds of Male Fern* (one part of the *buds* to eight of *ether*) has been used with advantage as an anthelmintic; and a decoction, in the proportion of an ounce of the *rhizoma* to a pint of water, has been occasionally prescribed.

6. GRANA'TI RADI'CIS CORTEX.—BARK OF POMEGRAN'ATE ROOT.

Punica Granatum, Pomegranate; SEX. SYST. Icosandria Monogynia; NAT. ORD. Myrtaceæ—Granateæ (Don),—appears to be a native of Northern Africa, whence it was transported to Italy at the time of the Carthaginian wars. It is also indigenous in Bengal, China, and Persia.

The bark of the root—which is the part used as an anthelmintic—is usually in small fragments, in quills or portions of quills, of a yellowish, or ash-gray color externally; and yellow within. It is brittle and not stringy, and has a faint peculiar smell, and an astringent taste. It has often been subjected to analysis; and has been found by M. Latour de Trie, to contain,—1, a matter which was considered to be peculiar, and to which the name *Granadin* or *Grenadin* was given, but which has been shown to be *mannite*. 2. Tannic acid, to which—as well as to a small portion of gallic acid—its astringency is owing; and 3. Resin. Analysis sheds no light on its anthelmintic properties. It yields its virtues freely to water.

Fig. 42.



Punica granatum.
1. Calyx and stamens. 2. Stamen. 3. Fruit.

Pomegranate root bark is rarely employed at the present day except as an anthelmintic, and not often with that view. It is said, when given in full doses, to induce nausea, vomiting, and purging, and occasionally giddiness and faintness. This would seem to show that it possesses acro-narcotic properties, on which its anthelmintic virtues may be dependent.

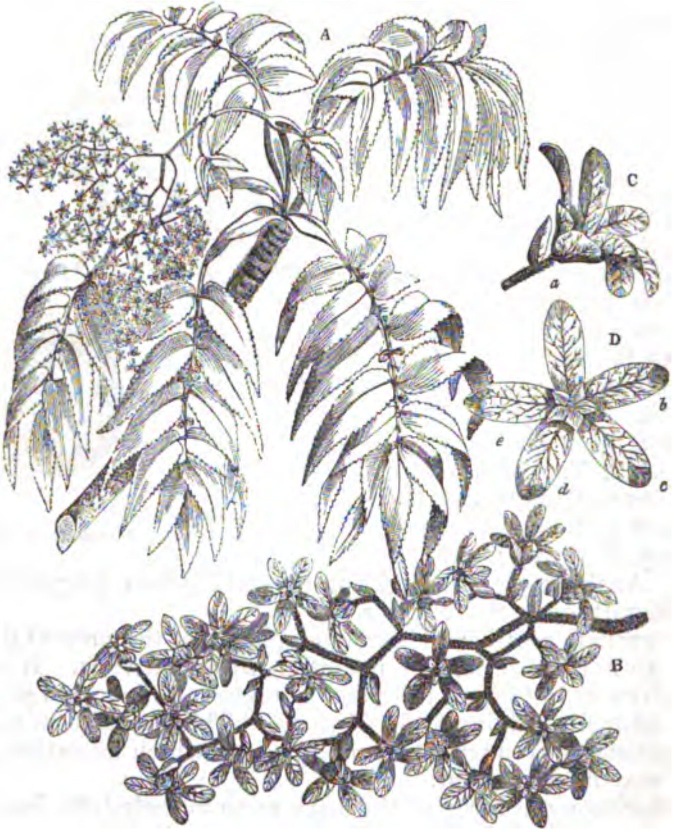
The testimony in favor of the bark as an anthelmintic has been discordant. It is especially in cases of tænia that it has been employed; and numerous trials have been made with it in England, France, Germany, and Italy; yet in extensive experiments at the Polyclinical Institute of Berlin it proved of no value; but this failure was referred to some imperfection in the drug. The fresh bark possesses far more virtue than the dried: the latter has, indeed, been regarded as inert. It is almost always given in decoction, which may be prepared with two ounces of the *bark*, boiled in a quart of *water* down to a pint and a half. Of this, the dose is f℥ij, every half hour until the whole is taken. The formula, cited by Dr. Paris from Dr. Ainslie's "*Materia Medica of Hindoostan*," directs it to be prepared with ℥ij of the *fresh bark*, boiled in a pint and a half of *water*, until only three quarters of a pint remain.

An *alcoholic extract of the bark of the root* is recommended by Deslandes.

7. BRAY'ERA ANTHELMIN'TICA.—KOUSSO.

The flowers of *Brayera anthelmintica*, *Hagenia Abyssinica* or *Banksia Abyssinica*, a native of Abyssinia, of the family Rosaceæ, have been long celebrated in their native country as potent anthelmintics. They are generally known under the name *Kousso*, *Koosso*, or *Kosso*.

Fig. 43.



Brayera anthelmintica.

A. Flowering branch. B. Bunch of female flowers. C. Flower seen laterally. D. Female flower. *a*, *b*, *c*, *d*, *e*. The five outer segments of the calyx.

Thirty years ago they were introduced to the notice of British practitioners by Brayer, a French physician, practising in Constantinople; but it was not until Pleininger, some years afterwards, obtained the article, that trials were made with it. These confirmed the reports previously received in regard to its efficacy in tape-worm. Of late years, attention to it has been revived; and good effects have been produced by it, both in Europe and in this country. But it has been little used, in consequence of its excessive price. This, however, has recently been greatly reduced, so as to admit of the trials which have been made of it in this country and elsewhere.

The results by no means justify the expenditure. (*New Remedies*, edit. cit. p. 150.)

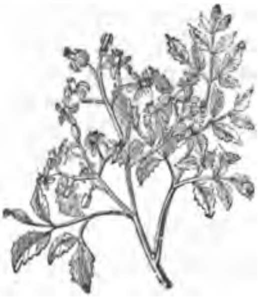
The flowers are brought from Abyssinia, compressed in boxes. They have a fragrant smell; and a taste, not much perceived at first, but, subsequently, somewhat acrid and disagreeable. In an overdose, kousso acts as a drastic cathartic; but it is not necessary for it to produce any purgative operation. It appears to be a true anthelmintic, and to destroy the worms, without, at all times, exhibiting a perceptible influence on the patient.

Half an ounce of the powdered flowers, mixed with half a pint of warm water; the mixture being allowed to stand for fifteen minutes; stirred up, and taken in two or three draughts at short intervals, is the medium dose. Should it not open the bowels in three or four hours, a cathartic is often given.

8. AZED'ARACH.

The bark of the root of *Melia Azedarach;* Sex. Syst. Decandria Monogynia; Nat. Ord. Meliaceæ; is in the secondary list of the Pharmacopœia of the United States. The tree termed *Pride of China*, *Pride of India*, *Bead Tree*, and *Poisonberry Tree*, is a native of oriental countries; but is cultivated as an ornament in various parts of the world. It is very common in the Southern States, but does not flourish farther north than Virginia.

Fig. 44.



Melia Azedarach.

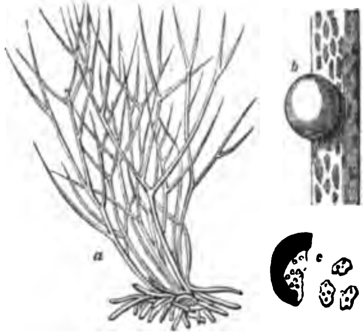
The berries are reputed to be poisonous, yet they are said to be eaten by children at the South without inconvenience, and are considered to be anthelmintic. The bark of the root—the officinal portion—has a bitter nauseous taste. Its virtues are imparted to boiling water. It is regarded by many as one of the most valuable anthelmintics; and when given in large doses is unquestionably acro-narcotic. It is usually prescribed in decoction. (*Azedarach.* recent. ℥iv; *Aquæ* Oij; coque ad Oj et cola. Dose, f℥ss, every two or three hours, till it exhibits its effects on the stomach or bowels.)

9. FUCUS HELMINTHOCOR'TON.

Fucus seu *Plocaria Helminthocorton*, *Helminthocorton*, *Corsican Wormweed;* Nat. Ord. Algæ,—Algaceæ (Lindley), is a marine plant, which grows on the coast of the Mediterranean, and especially of the Island of Corsica. The whole plant is employed as an anthelmintic in Europe; but it is not used in this country. The American editors of the *Manual of Materia Medica and Pharmacy* of MM. Edwards and Vavasseur affirm, that it is the best vermifuge with which they are acquainted, and that they witnessed in Corsica the most astonishing effects from it.

The dose of the powder is from gr. x to ʒij, mixed with molasses. It is also given in *infusion* and *decoction*, and it is affirmed by Dr.

Fig. 45.



Plocaria Helminthocorton.

a. The plant (natural size). *b.* A small stony coral attached to the thallus, and which may be readily mistaken for the fructification. *c.* The same broken and magnified to show the pores.

James Johnson, that when thrown into the rectum it "destroys any worms domiciliating there as effectually as choke-damp would destroy the life of a miner." Yet its effects on the economy are scarcely appreciable; and chemical analysis sheds no light in regard to its anthelmintic principle or principles.

10. SO'DII CHLO'RIDUM.—CHLORIDE OF SO'DIUM.

The value of common salt—whose general properties are described under CATHARTICS—as a condiment in the prevention of worms, has already been mentioned (p. 225). It was also remarked, that experiments have shown it to be detrimental to entozoa when out of the body. Hence it has been administered as a true anthelmintic. Its cathartic powers might entitle it to be placed also under another of the divisions of anthelmintics.

When given as a true anthelmintic, it is generally in large doses—from ℥ss to ℥j; and in cases of oxyures or ascarides vermiculares, it may be thrown into the rectum in strong solution.

11. TANACE'TUM.—TANSY.

The herb *Tanacetum vulgare*, *Tansy*; SEX. SYST. Syngenesia Polygamia superflua; NAT. ORD. Compositæ Corymbiferæ; is an herbaceous plant, indigenous in Europe, but introduced into this country, where it grows wild on the roadsides, and is cultivated in the gardens. It flowers from July to September.

The whole herb has a strong, peculiar and disagreeable odor, and a nauseous, bitter, and aromatic taste. It has been subjected to analysis, and found to be essentially composed of volatile oil—*Oleum Tanaceti*—which has the peculiar smell of the plant, and a warm bitter taste; and of a bitter matter, which is usually denominated extractive, but has been regarded as partly resinous. Still, the main properties are extracted by water; and all, probably, by alcohol.

Tansy is chiefly used as an anthelmintic in domestic practice. It is rarely prescribed by the physician, and is therefore placed in the secondary list of the Pharmacopœia of the United States. Its anthelmintic virtues are probably dependent both on the bitter principle and the volatile oil; the latter of which is more destructive to the parasites; whilst the former, like bitters in general, is adapted for giving tone to the digestive function, and to the whole system; yet the seeds, which contain the largest proportion of the bitter principle, and the smallest of volatile oil, are said to be most effective. It is generally given in infusion, *Tansy Tea;* prepared by infusing ℥ij of the *herb* in Oj of *boiling water*, the dose being from f℥j to f℥iij.

The seeds might be given in powder, in the dose of from gr. xxx to ʒj; or a few drops of the oil be administered in molasses.

12. CREASO′TUM.—CRE′ASOTE.

For its general properties, see Excitants.

Several portions of tape-worm having been observed to be discharged during the administration of creasote, it has been prescribed, in such cases, as a true anthelmintic. From five to eight drops may be given to adults in an ordinary dose of oleum ricini. It has, likewise, been associated with oleum tiglii.

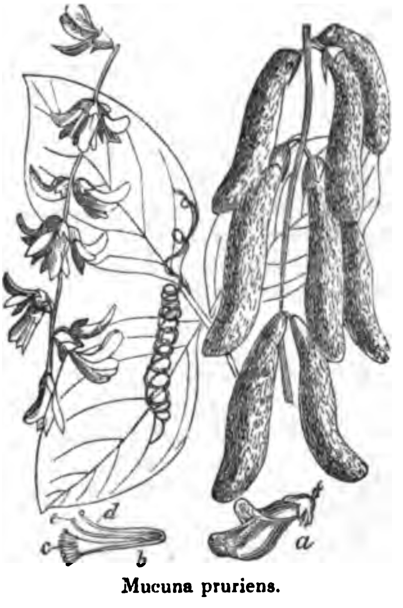
The Seeds of the Pumpkin—*Cucurbita pepo*,—have been used with advantage, as a tæniafuge. They may be taken, bruised, in the dose of about two ounces, in the morning, fasting, followed, in an hour or two, by a fluidounce of castor oil. An infusion of the bruised seed has proved effectual, as well as the fixed oil, of which they contain a considerable quantity. Half a fluidounce may be given in the morning fasting, and the same quantity in about two hours more. This may be followed by an ounce of the oleum ricini. In this way a considerable quantity of the worm has been brought away.

II. *Mechanical Anthelmintics.*

13. MUCU′NA.—COWHAGE.

In the language of the Pharmacopœia of the United States, Mucuna is the "bristles of the pods of *Mucuna pruriens*, *Dolichos pruriens*, *Stizolobium pruriens*, *Cowhage*, *Cowitch*." Sex. Syst. Diadelphia Decandria; Nat. Ord. Leguminosæ—a climbing plant, indigenous in the West Indies. The pod or legume, as met with in the shops, is of a brownish color, shaped like the italic *f*, containing four to six seeds, and covered with a pubes of stinging hairs, *setæ*, which when placed on the skin, pierce it, and give rise to intense itching, and in some persons, to cutaneous inflammation. The best application, in such cases, is oil. Rubbing the part always increases the local phenomena.

Fig. 46.



Mucuna pruriens.

a. Flower. *b*. Stamens. *c*. United do. *d*, *e*. Separate do.

Mucuna has long been celebrated as a mechanical anthelmintic. That its action is mechanical is proved by the circumstance, long ago observed, that worms, under its use, are discharged alive. When experiments, too, have been made on entozoa out of the body, the setæ have been observed sticking in them, and the animals twisting about, evidently in great torture. That an anthelmintic effect is produced upon them by cowhage within the human body appears to be well supported. The testimony in favor thereof has been satisfactory; and the author himself has repeatedly seen its exhibition followed by the evacuation of entozoa after other anthelmintics had been given fruitlessly. The difficulty has been to understand how it could act upon the worms, and not equally irritate the lining membrane of the intestines, and this difficulty has caused the efficacy of the medicine to be discredited. It is impossible, however, to set aside the numerous facts that have been brought forward in its favor; and it would seem, that the mucus, which covers the membrane, may prevent the setæ from penetrating it as it does the worms.

Mucuna has been considered best adapted for the removal of *Ascarides lumbricoïdes*, the "long round worm," and *Oxyures vermiculares*, the "small thread worm." The latter are, however, so low down in the intestinal canal, that its influence can scarcely be as powerful on them. It may be given in the form of electuary, the pods being dipped in molasses, and the setæ scraped off until the mixture has attained the consistence of thick honey. Of this, a tablespoonful is a dose for an adult; a teaspoonful for a child three or four years old. It may be administered for three nights in succession; and the following morning, a brisk cathartic may be given.

Mucuna is not much used in this country. The framers of the last edition of the Pharmacopœia of the United States have transferred it from the primary to the secondary list.

14. COR'YLUS ROSTRA'TA.—BEAKED HAZEL.

Beaked Hazel is a shrub two or three feet high, of the NAT. ORD. Amentaceæ; SUB. ORD. Cupuliferæ; SEX. SYST. Monœcia Polyandria, which grows in the mountainous regions of North America. The nut which it produces is of an ovate shape, surrounded by a coriaceous and scaly involucre or cupula, terminating in a tube an inch and a half long, covered with short and thick bristles, very similar to those of mucuna. These have been found by Dr. Heubener, of Bethlehem, Pennsylvania, to possess anthelmintic virtues similar to mucuna, and to equal it in all respects.

It may be given, like mucuna, in syrup, molasses, or other consistent vehicle; and in the same doses.

15. PULVIS STANNI.—POWDER OF TIN.

Powder of Tin, *Granulated Tin*, *Granular Tin*, is prepared by melting tin in an iron vessel over the fire, and, whilst it is cooling, stirring it until it is reduced to a powder, after which it is passed through a sieve. Tin may also be reduced to powder by shaking it when melted, in a wooden box, the inside of which has been rubbed with chalk.

The testimonials in favor of this mechanical anthelmintic have been numerous. It has been strongly recommended not only in *Ascarides lumbricoïdes*, but also in *Tænia solium*. It was at one time conceived, that its good effects might be owing to its combination with arsenic; but this supposition has been negatived by the equal success that follows its use in a pure state. In all probability, it acts by the incessant annoyance occasioned by the friction of the particles of the tin, which renders the situation of the entozoa uncomfortable to them, and induces them to migrate; whilst the same friction on the mucous coat of the intestines increases their peristaltic action and favors the object; or, if it fails to do this, it augments chylosis, and improves the general tone of the digestive system. The dose to children is from ʒss to ʒij and more; to adults ℥ss and more, in molasses, every night for three nights. On the following morning, a brisk cathartic may be given.

SECTION II.

AGENTS THAT AFFECT PROMINENTLY THE RESPIRATORY ORGANS.

EXPEC′TORANTS.

Synon. *Anacathartics.*

Definition of expectorants—Organs on which they act—Modus operandi—Are indirect agents only—Inhalations—Special Expectorants.

Expectorants are usually defined to be—"Agents that promote the excretion of mucus and other fluids from the lungs and air-passages."

To understand whether we are possessed of any substances that exert a special action of this kind, it is necessary to inquire into the anatomical constitution of the bronchial tubes, and into the mode in which reputed expectorants may affect them.

The whole of the larynx, trachea, and probably bronchial tubes, is lined by a mucous membrane, whose office it is to secrete mucus, and to serve the purpose of mucous membranes in general. From this membrane it is, that the humor of expectoration is secreted. Surrounding the air-tubes, probably even in their minutest divisions, is a contractile coat, which has an important agency in the phenomena of expectoration. In the trachea an obvious muscular structure exists at its posterior third, where the cartilages are wanting. This consists of a thin, muscular plane, the fibres of which pass transversely between the interrupted extremities of the cartilaginous rings of the trachea and the bronchia. The use of this muscular tissue is to diminish the calibre of the air-tubes in expectoration; so that the air having to pass through the contracted portion with greater velocity, its momentum, in coughing, may remove the secretions, that are adherent to the mucous membrane. The phenomena of asthma, as M. Laënnec has correctly observed, occasionally exhibit a manifest temporary constriction of the minute bronchial ramifications, affording, indeed, every evidence of a spasmodic attack, —the essential cause being probably seated in the ramifications of the pneumogastric nerves distributed to the bronchial tubes, whilst, at other times, the phenomena indicate rather a paralyzed than a spasmodic condition of the muscular fibres.

The quantity of the matter of expectoration, and the facility with which it is secreted, must depend upon the condition of the mucous membrane. Occasionally the sputum is derived from the breaking down of tubercles, or from positive abscesses in the lungs, but these are not the most common cases in which expectorants are employed;—such, at least, as are regarded to exert a special action on the lining membrane of the air-passages, when taken into the stomach, or introduced, in any manner, into the circulation. If the bronchial mucous membrane be inflamed, as in acute bronchitis, the secretion from it may be wholly arrested for a time, after which it may become augmented, as in cases of inflammation of mucous membranes in general; or, if the inflammation be to a less extent, and protracted, a profuse secretion may take place from it, attended with every symptom of general asthenia, as in some of the cases of winter-cough or chronic bronchitis of old people. In these different conditions of the mucous membrane, a different condition of expectorant medication is demanded. In the former, marked by every sign of internal inflammation, the antiphlogistic plan is imperiously required; whilst in the latter, depletion is by no means indicated, and, on the other hand, general and local excitants may be found advisable. These, however, are indirect expectorants, adapted for the removal of the condition of the system, which gives rise to the diminished or augmented secretion from the bronchial mucous membrane.

Again, when the sputa are secreted, they often adhere to the membrane, and are expelled with difficulty; at times, because the inflammatory condition, above mentioned, does not admit of their ready detachment; and, at others, owing to a want of due vigor in the system in general, and in the muscles concerned in expectoration in particular. In the former case, antiphlogistics, nauseants, &c., become indirect expectorants; in the latter case, substances, which, like ammoniacum, myrrh, and the different balsams, are excitants; or, again, agents that are capable of inducing emesis, during the succussion accompanying whose operation the mucus becomes detached, and its expulsion favored. In these cases a nauseating emetic is most beneficial if inflammatory irritation exists to any extent; for, during the nausea, which precedes emesis, the secretion from the bronchial mucous membrane is favored; and by the act of vomiting succeeding to the increased secretion, the mucus is readily detached, and expectorated. In this way, nauseants and emetics become expectorants.

All these, however, are indirect agencies only, and it is important to inquire, whether there be such remedies as *direct expectorants*, or, in other words, any that act on the bronchial mucous membrane by preference, after having been received into the stomach, and entered the mass of blood; for it is manifest, that this is the only mode in which any internal expectorant can come into immediate contact with the seat of the mischief. The expectorant, whatever it may be, must be received into the circulation either by imbibition through the coats of the gastroenteric bloodvessels, or through the chyliferous vessels. In either case, it must proceed to the heart, and pass with the blood of the bronchial artery to the bronchial mucous membrane; and although—as has been shown—it cannot be denied, that many local excitants when received into the bloodvessels, affect the particular parts of the frame on which they act by preference, we have no sufficient reason for the belief, that this is the case with any of the remedies that are reputed to be expectorants. None of them appear to affect the bronchial mucous membrane by preference; they exert upon it an indirect action only. An attentive examination of the properties ascribed to the different agents, ranked under this division, can scarcely fail, indeed, to lead the intelligent therapeutist to the deductions of Dr. Paris. "If the term *expectorant*"—he remarks—"be intended to express a medicinal substance, which has the power of promoting the expulsion of fluid from the lungs, by some *specific action* on the parts concerned, we have no hesitation in at once rejecting the word, and denying the existence of such remedies; if, however, the term be received conventionally, as comprehending all those substances, which are capable, according to the state of the system in each particular case, of producing expectoration, it will be extremely proper to recognize, and particularly useful to retain, such a class of medicinal agents." A more recent writer, Dr. Spillan, has remarked that "there probably exists no class of medicines, which so fully establish the truth of the principle, that medicines are but relative agents, as the class now under consideration."

These are the only views, that can be rationally maintained, and much careful discrimination becomes necessary to determine upon the precise kind of indirect agency that may be demanded in any particular case; immense mischief has indeed been done by the promiscuous prescribing of reputed expectorants, under circumstances contraindicating their employment. The pathology of many of the varieties of cough has been but little attended to until of late years. Its frequent identity with bronchitis was not suspected, or if suspected, disregarded. Expectorants, in such cases, were freely administered,—substances that is, which were considered to be possessed of direct powers over the parts concerned in the formation of the matter of expectoration; and as almost all these remedies belonged to the class of excitants, it may be imagined, that mischief frequently followed their administration. This every practitioner must have witnessed from the injudicious use of excitant cough mixtures, administered when the system has been laboring under general febrile indisposition, connected with, or dependent upon, the bronchitis, for which the expectorant was originally recommended. The judicious practitioner, in such cases, whilst he pays proper attention to the febrile and inflammatory symptoms, generally restricts himself, as far as may be, to the employment of demulcents. These, by passing over the top of the larynx, soothe the mucous membrane with which they come in contact, and by contiguous sympathy the soothing influence is propagated to the part of the bronchial mucous membrane laboring under irritation.

Almost every division of medicinal agents may become expectorant, according to the precise condition of the system generally, or of the pulmonary organs particularly; hence we find an expectorant effect equally from depletives, and from tonics and excitants; from narcotics and counter-irritants; and from nauseants and emetics.

Although the existence of any internal expectorant acting through the stomach and the circulation on the lining membrane of the air-passages may be doubted, there is a mode of exhibiting remedies, so that they may come into immediate contact with the bronchial mucous membrane, so as to modify its functions effectively,—that is, by INHALATION. In this way soothing or relaxing vapors may be made to act upon the inflamed membrane, especially after the violence of inflammatory action has been previously somewhat subdued by appropriate antiphlogistics. Under such circumstances, the vapor of *hot water* is employed with much advantage, and in cases of asthma relief is occasionally obtained by the addition of some *volatile oil*, as by inhaling the vapor from a *hot infusion of chamomile flowers*. With the same view, *ether* is occasionally added. In some cases of asthma, there appears to be a condition of the pneumogastric nerves somewhat resembling paralysis, which excitants, introduced in the manner referred to, are as well adapted to remove as any other agents. The vapors of burning substances, as of tar and resin, are occasionally inhaled, and they may be employed with advantage in chronic bronchitis, when the inflammation is of an asthenic character, or when the activity of the inflammation has passed away, and the copious secretion from the membrane is the most annoying symptom. The vapors of *boiling tar* were at one time strongly recommended by Sir A. Crichton in consumption, but experience has shown that not much reliance can be placed upon them in that fatal malady; and many of the cases of benefit, derived from such inhalation, have probably been of the kind just referred to—chronic bronchitis.

Fig. 47.

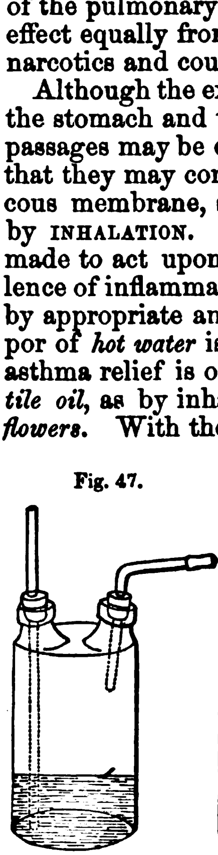
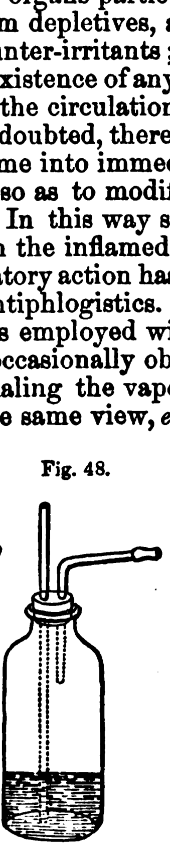


Fig. 48.



Inhaling Bottles.

The practice of smoking the roots of *stramonium* in asthma, and other pulmonary affections has long existed, and frequently essential benefit is derived from it. There is something inexplicably capricious in this singular disease. Whilst one asthmatic cannot sleep in town, another cannot remain in the country. A friend of the author, a most respectable inhabitant of Baltimore, now dead, was unable to sleep at his country-house, which was not more than a mile and a half from the centre of the town. He tried the experiment frequently, and the result was always the same. The author has known others who could not exist in the impure atmosphere of towns. Others, again, prefer a dry, whilst many breathe more freely in a moist, atmosphere. The same thing, of course, applies to medicinal agents inhaled by the lungs. *Tobacco* relieves some, and aggravates others; but the smoke of stramonium agrees with a large majority of persons, and at times affords manifest relief. When suffering under a severe attack of the disease, the gentleman, above referred to as unable to sleep in the country, frequently made manifest to his medical attendant the relief he derived from its inhalation. For this purpose he employed the dried stalk. Others use the root, and others the leaves only. (For many similar cases, see the author's *Practice of Medicine*, 3d edit. 1, 364, Philad. 1848.)

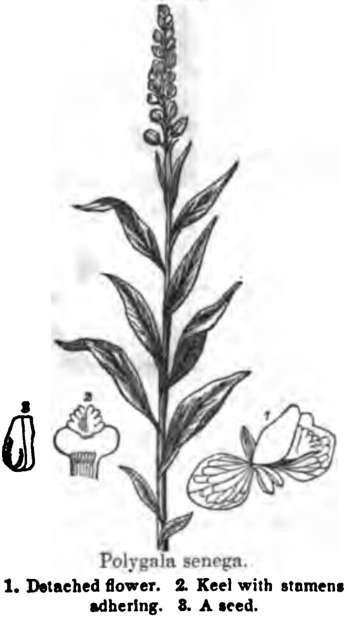
It is, too, in the way of inhalation, that ether, chloroform, and the different *gases* have been used therapeutically. The gases were first proposed by the enthusiastic Beddoes, and they are certainly capable of affecting the frame,—some as excitants, others as sedatives;—but difficulties, connected with their efficient administration, and uncertainty in the results obtained, have led to their almost total abandonment. They pass through the bronchial tubes, penetrate the bloodvessels by imbibition, and exert their appropriate action, either on the nerves distributed to the bloodvessels, or—what is more probable—affect the great nervous centres by reaching them through the circulatory current; but such agents cannot properly be ranked as expectorants. The administration and effects of these, as well as of ether and chloroform, will receive attention under other heads.

SPECIAL EXPECTORANTS.

I. *Excitant Expectorants.*

1. SEN'EGA.—SEN'EKA.

Fig. 49.



Polygala senega.

1. Detached flower. 2. Keel with stamens adhering. 3. A seed.

Seneka, *Seneka snakeroot*, *Rattlesnake root*, is the root of *Polygala Senega;* Sex. Syst. Diadelphia Octandria; Nat. Ord. Polygaleæ, an indigenous plant, common in every part of the United States, but abounding especially in the southern and western portions, where it is collected for use. As met with in the shops, it is of different sizes, from that of a writing-quill to that of the little finger, having a thick knotty head, which exhibits traces of the numerous stems. It is contorted, often marked by crowded annular eminences, with a projecting line running along its whole length. The cortical portion is corrugated, cracked transversely, and of a yellowish-brown or grayish-brown color. The smell is strong and peculiar in the fresh root, but faint in the dried; and the taste is at first sweetish and mucilaginous, leaving a peculiar acrid sensation in the fauces.

The whole of the virtues are resident in the cortical portion, the woody matter being inert, and therefore to be rejected in reducing seneka to powder. These virtues are yielded to boiling water, and to alcohol, especially to dilute alcohol. They seem to be partly dependent upon a substance called *Senegin*, *Polygalin*, and *Polygalic acid*, which has been esteemed by some to be an alkaloid; by others an acid; and which, when given to dogs, in the dose of 6 or 8 grains, has caused vomiting, difficult respiration, and death in three hours.

Seneka has been regarded as one of the best of the excitant expectorants; and in the form of *syrup of seneka* is largely used both in hospital and private practice, especially by those who prescribe according to a system of routine, and are guided by names rather than by phenomena. It is clearly excitant; and, therefore, not adapted for facilitating expectoration in affections of the chest of an inflammatory character. Yet, like squill, it forms part of a compound syrup—*Syrupus scillæ compositus*—associated with nauseating and emetic substances, which certainly fill contrary indications; and—as elsewhere remarked—it is probable that most, if not all of the benefit in many cases derived from the preparation is due to the nauseants and emetics contained in it. Dr. Pereira assigns to it a sphere of action, which is inexplicable; and to the author—who has employed it largely—inconceivable. "In this country" (England) —he remarks—"senega is comparatively little employed. It is an exceedingly valuable remedy in the latter stages of *bronchial* or *pulmonary inflammation*, when this disease occurs in aged, debilitated, and torpid constitutions, and when the use of depletives is no longer admissible. It appears to re-establish a healthy condition of the secreting organs, to promote the resolution of the morbid deposits, and to give strength to the system. I usually administer it in combination with ammonia, which appears to me to promote its beneficial operation. Frequency of pulse, and a febrile condition of the system are by no means to be regarded as impediments to the use of this medicine."

Seneka is rarely—or never—given in powder. Should it be desired to administer it in this form, the dose may be from ten to twenty grains.

DECOC'TUM SEN'EGÆ, DECOC'TION OF SEN'EKA.—(*Senegæ* cont. ℥j; *Aquæ* Oiss. Boil to a pint.) This decoction is by no means as much used as the syrup, the saccharine matter of which is itself demulcent, and therefore adapted for relieving cough and facilitating expectoration. Sugar, or liquorice root, or extract of liquorice, may be added to it.

SYR'UPUS SEN'EGÆ, SYRUP OF SEN'EKA.—(*Seneg.* cont. ℥iv; *Aquæ* Oj; *Sacchar.* ℔j. Made into a syrup, either in the ordinary method, or by displacement.) The dose, as an expectorant, is fʒj to fʒiij. It is a common adjunct to expectorant mixtures: and, in too many cases, for no other reason than because it bears the name of "expectorant," without regard to the pathological condition, or its adaptation to it.

Senega enters into the composition of *Syrupus Scillæ Compositus* of the Pharmacopœia of the United States.

2. SCILLA.—SQUILL.

Squill, the general properties of which have been detailed (p. 139), is often prescribed both with excitant and sedative expectorants; yet the union with the latter, in the small doses in which it is usually exhibited, cannot be philosophical, inasmuch as it is unquestionably excitant; and, therefore, adapted for cases of pectoral disease, in which there is an absence of all febrile and inflammatory phenomena, and a demand rather for excitant expectorants in general.

When given in powder, as an expectorant, which is rarely the case, it is usually in the dose of one grain, two or three times a day. As, however, it is a nauseant in a sufficient dose, it may be adapted, in a larger quantity, for affections in which sedatives are needed. In such cases, it must be pushed until its influence on the stomach is exhibited.

Acetum Scillæ (p. 140) is occasionally prescribed as an expectorant, in the dose of fʒss to fʒj; but by no means so frequently as the *Oxymel* (p. 140); and the syrups—simple and compound (p. 141); the former in the dose of fʒj to fʒij; *Syrupus Scillæ*, in the dose of a fluidrachm or two; and *Syrupus Scillæ Compositus* or *Hive Syrup*, in the dose of twenty or thirty drops.

Tinctura Scillæ (p. 140) is rarely given alone; but is often added to pectoral mixtures. Its dose is from twenty drops to a fluidrachm.

PIL'ULÆ SCILLÆ COMPOS'ITÆ, COMPOUND PILLS OF SQUILL.—(*Scill.* pulv. ʒj; *Zingib.* pulv.; *Ammoniac.* pulv. āā ʒij; *Saponis* ʒiij; *Syrup.* q. s. To be divided into 120 pills.) The dose is from 5 to 10 grains.

3. AMMONI'ACUM.—AMMO'NIAC.

The botanical history of ammoniacum has been a matter of uncertainty. Of late years, however, owing to the researches of observers in India, it has been referred to *Dorema Ammoniacum;* Sex. Syst. Pentandria Digynia; Nat. Ord. Umbelliferæ, a native of Persia, of which it is the concrete juice. The whole plant contains a large quantity of a milky juice, which oozes out whenever punctures are made, even at the ends of the leaves. It would appear, however, that these are never made artificially, but that innumerable beetles pierce the plant in all directions. When dry, the ammoniac is picked off, and collected. Dr. Pereira states that he has, in his museum, the upper part of the apparently flowering stem, about ten inches long, with lumps of ammoniac sticking to it at the origin of every branch.

Ammoniac, as met with in commerce, usually comes from Bombay, but sometimes from the Levant. It is either in the state of tears, or in lump. The former is in more or less spheroidal tears, but often in larger pieces of an irregular shape. They are of a yellowish color externally, and whitish within. At ordinary temperatures, they possess considerable hardness, but soften under the heat of the hand.

Lump ammoniac consists of whitish tears, imbedded in a substance of a darker color, and containing numerous extraneous matters, as seeds, fragments of vegetables, and dirt. The odor of both varieties is peculiar, and by no means agreeable; and the taste nauseous, bitter, and somewhat acrid.

Ammoniac is a gum-resin, which has been subjected to analysis by many chemists, and found to consist of about 70 per cent. of resin, and about 20 of gum. It contains also a volatile oil, which is separable by distillation with water. With this fluid it forms a preparation, which is officinal—*mistura ammoniaci.* The alcoholic solution, which is transparent, becomes milky on the addition of water.

It has been long employed as an expectorant of the excitant class, and, consequently, in cases in which there was little or no inflammatory action. It would not seem, however, that its excitant properties are energetic; and, from the author's experience, it is not entitled to the credit that has been assigned it in chronic bronchitis, and catarrhal affections in general. Such, indeed, appears to be the prevalent belief, if we may judge by the much smaller employment of the drug now than formerly.

The dose is generally stated to be from ten grains to thirty in pill. It is rarely given in this simple form, but in combination with other reputed expectorants, as in *Pilulæ Scillæ Compositæ* of the Pharmacopœias of Edinburgh and the United States, or *Pilulæ Ipecacuanhæ Compositæ* of the London Pharmacopœia (*Pulv. Ipecac. comp.* ʒiij; *Scillæ* recentè exsiccat., *Ammoniac.* āā ʒj; *Mucilag. acaciæ* q. s. ut fiat massa. Dose, five grains to ten).

MISTU'RA AMMONI'ACI, AMMO'NIAC MIXTURE.—*Ammoniac.* ʒij; *Aquæ* Oss. This mixture was formerly called *Lac Ammoniaci*, owing to its white appearance. The gum of the gum-resin forms a mucilage, by which the resinous portion is suspended. The greater part of the resinous matter subsides, however, on standing. When given alone in pectoral affections, the ordinary dose is one or two tablespoonfuls. It not unfrequently forms a vehicle for other agents, as *Tincture of Opium*, *Syrup of Seneka*, &c.

Ammoniac enters into the composition of *Pilulæ Scillæ Compositæ* of the Pharmacopœia of the United States.

4. BAL'SAMUM PERUVIA'NUM.—BALSAM OF PERU.

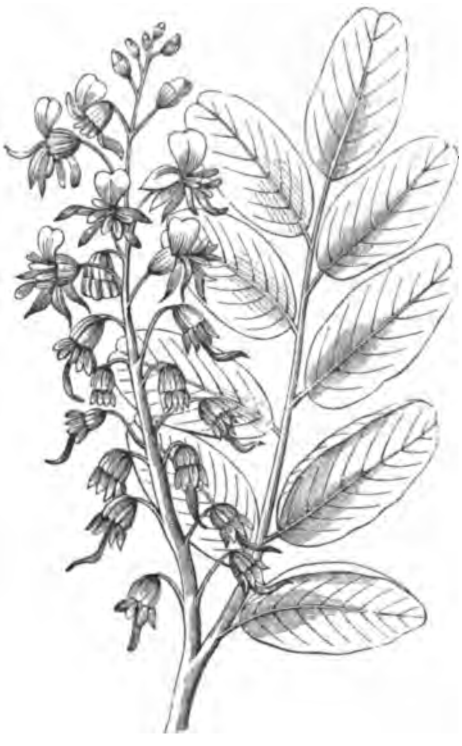
Balsam of Peru is the juice of *Myroxylon* or *Myrospermum Peruiferum;* SEX. SYST. Decandria Monogynia, NAT. ORD. Leguminosæ, which is indigenous in Peru, New Grenada, Colombia, and Mexico.

In regard to its history there is some uncertainty. It has been affirmed, that there are two modes of obtaining it—one by incisions made into the bark of the tree, and the other by boiling the branches and trunk in water;—the former yielding a white liquid balsam; the latter a blackish-red liquid. The former, it is said, may be preserved for years in the fluid state; but if deposited in calabashes, which is commonly done in the mountains of Tolu, it condenses, after a time, and hardens into resin; it is then termed *Dry white balsam*, or *bal-*

sam of Tolu; whilst the extract, made by boiling the bark in water, is blackish, or remains liquid, and is known by the name of *black Peruvian balsam.* There seems still, however, to be a doubt, whether the black Peruvian balsam of the shops is prepared by coction.

The quantity of balsam of Peru on which duty was paid in England, in the year 1839, was, according to Dr. Pereira, 825 lbs.

Fig. 50.



Myroxylon Peruiferum.

Balsam of Peru is transparent, of a deep reddish-brown color, and of the consistence of molasses. It has a fragrant aromatic odor; and a hot and bitter taste. It is soluble in alcohol, and miscible with water by means of mucilage. Its specific gravity is variously stated, from 1·14 to 1·16. It is rarely adulterated. When subjected to analysis, it yields 88 per cent. of resin, 12 of benzoic acid, and a trace of volatile oil. Prolonged boiling in water removes from it the benzoic acid, but nothing else.

It was at one time much used as an excitant, in external and internal ulcerations; and hence it has been prescribed as an expectorant in phthisis; in chronic bronchitis; and wherever a gentle excitant is needed. The dose is f℥ss to f℥i, dropped on sugar, mixed with molasses, or diffused in water by means of mucilage or yolk of egg.

5. BAL'SAMUM TOLUTA'NUM.—BALSAM OF TOLU.

Balsam of Tolu is now considered to be the juice of *Myrospermum* or *Myroxylon Toluiferum;* Sex. Syst. Decandria Monogynia; Nat. Ord. Leguminosæ; which is indigenous in the mountains of Tolu especially. It is obtained by making incisions into the trunk of the tree, collecting the juice, as it exudes, in appropriate vessels, and allowing it to concrete. It is commonly imported in little calabashes; and it does not appear to differ from the concrete white Peruvian balsam, which, as stated above, is termed balsam of Tolu. It is imported chiefly from Carthagena.

When it first arrives in this country, it is usually soft and tenacious; but, when kept, becomes hard and brittle, somewhat like resin. It is transparent; of a yellowish-brown color; has a highly fragrant odor, and a sweetish, not disagreeable taste. It is very soluble in alcohol, ether, and the essential oils; and yields its benzoic acid to boiling water. Its chemical composition is similar to that of balsam of Peru.

It is employed as an expectorant in the same cases as balsam of Peru, and is far more frequently prescribed. It has never appeared to the author to possess any special action in chronic bronchitis; but it makes an agreeable adjunct to cough mixtures in the form of *Syrup of Tolu.* In chronic catarrhal affections, the inhalation of the vapor of the ethereal solution is said to have been of benefit. The dose of the balsam is from gr. x to gr. xxx, repeated from time to time. It may be given in the form of an emulsion made with mucilage of gum arabic. (*Bals. Tolutan.* ʒi; *Mucilag. acaciæ* f℥ss; *Syrupi* fʒiij; *Aquæ* f℥v. M.)

TINCTU'RA TOLUTA'NA, TINCTURE OF TOLU.—(*Tolutan.* ℥iij; *Alcohol.* Oij.) This is sometimes added to pectoral mixtures, but is chiefly employed in the formation of the syrup.

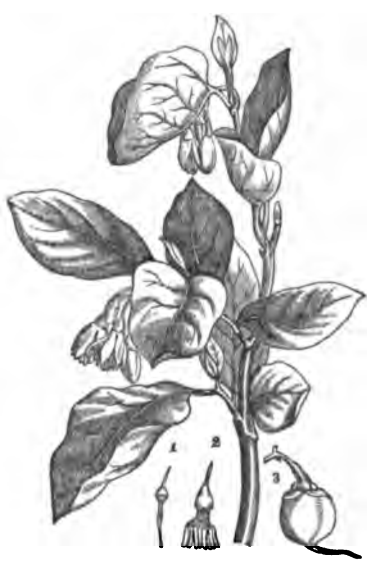
SYR'UPUS TOLUTA'NUS, SYRUP OF TOLU.—(*Tinct. Tolut.* f℥iss; *Aquæ* ℔j; *Sacchar.* ℔ijss. Mix the tincture with the sugar; expose to a gentle heat until the alcohol has evaporated; pour on the water; heat gradually till the sugar is dissolved, and strain.) This is a very common adjunct to pectoral mixtures, to which it appears to communicate no virtues, but improves their flavor. Yet MM. Trousseau and Pidoux affirm, that they have cut short by it acute bronchitis, "which had reached the first septenary," and which they think, "would doubtless have gone on for a month or six weeks without the aid of this precious agent." In infants, it appeared to them of immense advantage in pulmonary catarrh, almost at the very onset of the affection; and still more "when the state of irritation, dryness, and turgescence ot the mucous membranes having been allayed, the catarrhal secretion began to be effected."

Balsam of Tolu is an ingredient in *Tinctura Benzoini Composita* of the Pharmacopœia of the United States.

6. STYRAX.—STORAX.

Storax is the concrete juice of *Styrax officinalis;* Sex. Syst. Decandria Monogynia; Nat. Ord. Styraceæ (Lindley), a small tree, which is indigenous in Asiatic Turkey and Greece, and is cultivated in the southern parts of Europe. From incisions made into the tree, or from the punctures of an insect, the storax exudes. No precise knowledge exists as to the mode in which it is procured, as the natives of the country, who collect it, will not communicate their mode of procedure. It is imported into Great Britain from Trieste. Two varieties are met with in the shops;—*common storax,*—*styrax calami'ta* of some, and *liquid storax.* The former occurs in brittle cakes, several pounds in weight, of a reddish-brown color, and having a fragrant, agreeable, balsamic odor, and an aromatic taste. It appears to be composed of sawdust, cemented by a resinous matter. It can be easily reduced to coarse powder, and in this state is often met with in the shops. The latter has been supposed to be derived by decoction from *Liquidambar styraciflua;* but Dr. Wood remarks, that some of the genuine juice of Liquidambar, brought from New Orleans, which he had an opportunity of inspecting, had an odor entirely distinct from that of storax; and Dr. Griffith confirms the statement of their dissimilarity from having had an opportunity of collecting the juice of the Liquidambar, which was widely different from any liquid storax he had ever seen. Moreover, it has been affirmed of late, that the liquid storax or *storax oil* is obtained at Cos and Rhodes from styrax officinalis. By means of longitudinal incisions, the bark of the stems is removed in small narrow strips, which, when pressed together, readily adhere by means of their glutinous juice; and in this way they are made up in bundles of about two pounds each. These are then subjected to pressure in warm presses, by which means a liquid storax is obtained, which, according to Landerer, cited by Dr. Pereira, has the consistence of butter, a gray color, and an odor resembling that of vanilla. It is doubtful, however, whether this is the liquid storax of the shops, which is of a brown, almost black color on the surface exposed to the air, but of a light greenish-gray color within, and of a smell somewhat resembling that of the Balsam of Peru.

Fig. 51.



Styrax officinalis.

1. Style. 2. Stamens and ovary. 3. Fruit.

Dr. Pereira has described not less than ten varieties, but the above are all that can concern the pharmacologist,—the others being rarely met with in commerce, and most of them never seen on this side of the Atlantic.

When subjected to analysis, storax yields a trace of volatile oil, about 50 per cent. of resin, and one or two per cent. of benzoic acid, the presence of which entitles it to a place among the balsams. It is so mixed—in the state in which it is met with in the shops—with extraneous matters that it requires to be purified; this is done according to a process directed in the British and American Pharmacopœias for STYRAX PURIFICA'TA, *purified storax,* which consists in dissolving the soluble matters in alcohol, straining the solution, and distilling off the alcohol, until the storax acquires the proper consistence. The volatile portion is not driven off by the heat of boiling alcohol; yet, as suggested by Dr. Christison, it may be well not to carry the concentration too far, in order that the fragrant principle may be better retained, and the extract be of a fitter consistence for forming pills.

Like some of the articles already mentioned, it has been considered to possess "stimulant properties, which are more particularly directed to the mucous surfaces, especially to the bronchial membrane;" but it may be doubted, whether either it or any of the articles referred to, be possessed of such powers. Like the other balsams, it is excitant, and might be employed in chronic catarrhal affections of the bronchia, in which excitant expectorants are needed. It is not often prescribed on this side of the Atlantic, or indeed anywhere; notwithstandig that the British colleges have a formula for the *Pilulæ Styracis Compositæ*, which consist essentially of *strained storax* and *opium*, and are occasionally given in chronic pulmonary affections to relieve cough; but are more valuable, perhaps, as a means of administering opium to persons prejudiced against it, the name and the balsamic character of the storax completely masking the narcotic.

Should it be desired to administer storax, the dose may be ten to twenty grains, two or three times a day,—or common, or liquid storax may be suspended in water by means of mucilage of gum arabic.

Purified storax enters into the composition of *Tinctura Benzoini Composita* of the Pharmacopœia of the United States.

7. BENZO'INUM.—BEN'ZOIN.

Benzoin or *Benjamin* is the concrete juice of *Styrax Benzoin*, *Benjamin Tree;* SEX. SYST. Decandria Monogynia; NAT. ORD. Styraceæ,—a tall tree, indigenous in Sumatra, Borneo, Siam, and Java. It is obtained in Sumatra, when the tree is about six years old, by making incisions in the bark, and allowing the juice to remain for three months. Fresh incisions are made after the concrete juice has been removed, until the tree is exhausted, and usually dies. The juice which exudes at the first incision is the best, and said to be alone exported to Europe. Each tree yields about three pounds of Benzoin annually for ten or twelve years.

Benzoin, met with in commerce, is usually imported into England from Singapore or Calcutta. In 1839, duty was paid there on 108 cwt. (Pereira). It is of different degrees of fineness, and is sometimes distinguished into *firsts*, *seconds*, and *thirds;* or more commonly, perhaps, into *firsts* and *seconds*, or into *fine* and *coarse;* and sometimes the finer kinds are termed SIAM BENZOIN; the commoner, CALCUTTA BENZOIN. The former contains white grains, which have the appearance of fragments of blanched almonds, seated in a deeper reddish-brown ground: the latter is more uniform, and has a dark reddish-brown or almost black color. Both are firm and pulverizable; of an agreeable, fragrant, balsamic odor, and a slightly aromatic taste. Boiling water takes up a little benzoic acid; alcohol dissolves all except the impurities, and the solution is rendered milky by the addition of water. Its chief constituents are resin, benzoic acid, and a trace of volatile oil. The amygdaloid benzoin contains 80·7 per cent. of resin, and 19·8 of benzoic acid; the coarser or brown benzoin, 78·4 per cent. of resin, and 19·7 of benzoic acid.

Benzoin had at one time a much higher reputation, as an internal remedy, than it has at present. Like the balsams and gum-resins, it was regarded as an excitant expectorant; and, as a relic of antiquity, it still holds its place in one or two formulæ. Should it be prescribed at all, it ought to be in pulmonary affections, which are unaccompanied by febrile or inflammatory excitement. It will be seen afterwards, that it is employed as a topical expectorant in the form of fumigation; and it is one of the ingredients of the fumigatory pastilles, which are largely used in oriental climes; and of the fumigating compounds employed in the Romish church.

It is scarcely ever, or never, administered in substance. The dose of the powder may be from ten to thirty grains.

TINCTU'RA BENZO'INI COMPOS'ITA, COMPOUND TINCTURE OF BENZOIN.—(*Benzoin.* ℥iij; *Styracis purificat.* ℥ij; *Bals. Tolutan.* ℥j; *Aloes* pulv. ℥ss; *Alcohol.* Oij.) The dose of this preparation, as an excitant expectorant, is fʒss to fʒij. It is rarely, however, employed. As the resin is precipitated on the addition of water, it may be made into an emulsion by means of mucilage of gum arabic. It is chiefly used as an external excitant to ulcers.

From Benzoin is formed *Acidum Benzoicum* of the Pharmacopœia of the United States.

8. AC'IDUM BENZO'ICUM.—BENZOIC ACID.

Benzoic acid, formerly termed *Flowers of Benjamin*, exists in the various balsamic substances, as benzoin, storax, Tolu balsam, &c. It is also met with in the vanilla pod, and in certain animal substances, as in the urine of children and of the herbivora under certain states of decomposition. In Pharmacy, it is obtained from benzoin by sublimation. Benzoin, in coarse powder, thoroughly mixed with an equal weight of fine sand, is put into a proper vessel, and, by means of a sand-bath, with a gradually increasing heat, it is sublimed until vapors cease to rise. The sublimed matter is deprived of oil by pressure in bibulous paper, and is again sublimed.

As met with in the shops, it is in light white feathery crystals, of an agreeable odor, and an acrid, feebly acid taste. It is fusible, and wholly volatilizes if cautiously heated; is soluble in about two hundred parts of cold water, and in about twenty-five parts of boiling water; is very soluble in alcohol, and readily dissolves in solution of potassa, from which it is precipitated by chlorohydric acid.

Its therapeutical action is, doubtless, excitant; and it has been imagined by Dr. Pereira, and others, that its influence is principally directed to the mucous surfaces, and, "especially to the aerian membrane." The author has not had any reason for believing in this special affinity, and such would appear to be the general feeling of the profession, as it is now scarcely used except in one or two officinal preparations, in which it seems to be retained only from old prepossessions and associations.

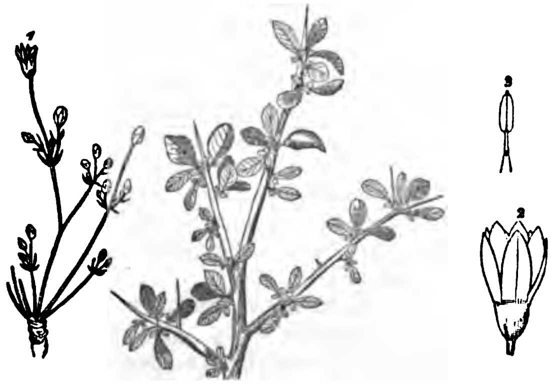
When given alone as an excitant expectorant, its dose is from ten to thirty grains; but the author has never administered it, or seen it administered, as such. It is occasionally used, as will be seen hereafter, as a topical expectorant; and forms part of TINCTURA OPII CAMPHORATA, *Paregoric elixir*, in which it probably exerts little or no agency. It enters, likewise, into the composition of *Unguentum Sulphuris Compositum* of the Pharmacopœia of the United States.

9. COPA'IBA.

Copaiba—whose general properties are described under EXCITANTS—has been much extolled by many respectable practitioners in chronic bronchitis, and in every form of pulmonary affection, in which a gentle excitant is necessary. It is not adapted for cases in which there is febrile or inflammatory action. Dr. La Roche, of Philadelphia, has adduced strong testimony in favor of it in diseases of the bronchial mucous membrane of the atonic kind, as well as in diseases of the mucous membranes in general. It may be given in the dose of twenty or thirty drops on sugar, or be made into an emulsion. (*Copaib.* f ʒiss; *Mucilag. Acaciæ* f ʒvj; *Syrup.* f ℥ss; *Aquæ* f ℥ivss.—M. Dose, one-fourth part, four times a day.)

10. MYRRHA.—MYRRH.

Fig. 52.



Balsamodendron myrrha.

1, 2, 3. Balsamodendron kataf.

Myrrh is the concrete juice of *Balsamodendron Myrrha;* SEX. SYST. Octandria Monogynia; NAT. ORD. Terebinthaceæ; a small tree, which is indigenous in Gison on the borders of Arabia Felix. It exudes from the bark of the tree, and concretes there. Formerly, the finest kind of myrrh was imported from Turkey, and an inferior variety from India; but it would seem that, at the present day, it almost all comes from the latter country. A considerable quantity of it is consumed; for, in the year 1839, according to Dr. Pereira, no less than 216 cwt. paid duty in England.

Myrrh of the shops is in irregular pieces of various sizes, differing in color,—the best pieces being of a reddish-yellow, and translucent. It is brittle, and capable of reduction to powder, and has a peculiar, somewhat agreeable odor; and a bitter, aromatic, but, in the author's opinion, disagreeable taste. The best myrrh should possess these qualities; but other varieties are occasionally met with,—a second quality, which is in distinct small tears or grains,—and a third quality, which occurs in pieces of a darker color than the best, and which, according to Dr. Pereira, are probably coarser myrrh mixed with impurities.

Of the drug imported into this country from July, 1848, to April, 1849, inclusive, Dr. Bailey, inspector of drugs at the port of New York, rejected 2977 lbs.

Myrrh is only partially soluble in water, alcohol, and ether: the gum enables the water to suspend a part of the resin. Dilute alcohol dissolves some of the resin, and less of the gum; whilst alcohol dissolves the resin and volatile oil, leaving the greater part of the gum; and as the first two are the active ingredients in myrrh, alcohol is generally used as the menstruum. The most recent analysis afforded 2·6 per cent. of volatile oil, 27·8 of resin, and 63·7 of gum.

It has been employed as an expectorant. From its constituents, it is obviously excitant, and, therefore, not adapted for any pulmonary affection in which there is vascular excitement. It has been occasionally prescribed in the same cases as the other excitant expectorants, but is not much used at the present day; and never, perhaps, except in combination. The dose is from gr. x to gr. xxx, in the form of pill. It may also be made into an emulsion, but its taste is an objection to it in this form.

TINCTU'RA MYRRHÆ, TINCTURE OF MYRRH.—(*Myrrh.* contus. ℥iv; *Alcohol.* Oiij.) Tincture of Myrrh possesses all the virtues of the drug, but it is scarcely ever prescribed internally. The dose, as an expectorant, is stated to be fʒss to fʒj.

Myrrh enters into the composition of various officinal formulæ, as *Mistura Ferri Composita; Pilulæ Aloes et Myrrhæ; Pilulæ Ferri Compositæ;* and *Pilulæ Rhei Compositæ* of the Pharmacopœia of the United States.

11. ASSAFŒ'TIDA.—ASSAFET'IDA.

Assafetida,—whose general properties are described under ANTISPASMODICS—is excitant, and therefore adapted for cases in which there is a want of due innervation in the respiratory apparatus, and, at the same time, no febrile or inflammatory action. In hooping-cough, it has been regarded as beneficial; but the author has subjected it to extensive trials, and has not been able to say positively, that any markedly good effects have resulted from it. In this disease it doubtless acts by virtue of the new impression it makes on the nerves, and is more properly an antispasmodic. In old cases of chronic bronchitis, and of chronic cough accompanied by nervous erethism occurring in any disease, it is prescribed. The dose is from gr. v to ʒss, in the form of pill; but it is rarely given alone, in this shape, as an expectorant.

MISTU'RA ASSAFŒ'TIDÆ, ASSAFET'IDA MIXTURE.—(*Assafœtid.* ʒij; *Aquæ*

Oss.) The gum of assafetida is sufficient to cause the suspension of the resin, so that *Lac Assafœtidæ*—as it was formerly called—contains the main virtues of the gum-resin. In the thoracic affections for which assafetida is deemed proper, this is a good form of administration. For children it may be sweetened with sugar; and although it may be disagreeable to them at first, they soon become accustomed to, and even fond of, it. The dose to an adult is f℥ss to f℥ij; to a child, one or two teaspoonfuls.

12. GAL′BANUM.

Galbanum,—whose general properties are described under ANTISPASMODICS,—possesses the same excitant virtues as the other so-called "antispasmodic" gum-resins; and is presumed to hold an intermediate place between ammoniacum and assafetida as an expectorant. It is very rarely, however, used as such,—on this side of the Atlantic, never perhaps. The dose is from gr. x to xxx, in the form of pill; or made into an emulsion.

13. AL′LIUM.—GARLIC.

The bulb of *Allium Sativum*, SEX. SYST. Hexandria Monogynia; NAT. ORD. Liliaceæ (Lindley), is a well-known culinary article, and although not much used in medicine is introduced into the Pharmacopœias of Great Britain and this country. Garlic is indigenous in the southern countries of Europe, flowering in July; and is everywhere cultivated in the kitchen-gardens.

The strong, peculiar, irritating smell, and acrid taste of garlic are owing to volatile oil, separable by distillation with water,—six drachms being obtained from twenty pounds of garlic. An acrid expressed oil can also be separated from it. The volatile oil has a very acrid taste; and strong smell.

Like all substances whose medicinal virtues are dependent upon volatile oil, garlic is excitant; and consequently, when employed as an expectorant, it can only be in cases where there is no active inflammation of the lining membrane of the bronchial tubes; and in states of the system and of the tubes, in which a gentle excitant is necessary, as in chronic bronchitis. In such cases, the expressed juice may be mixed with sugar; or the following preparation may be advised.

SYR′UPUS AL′LII, SYRUP OF GARLIC.—(*Allii* recent. ℥vj; *Acet. destillat.* Oj; *Sacch.* ℔ij; f. syrupus.) The vinegar is used in this preparation under the idea, that it is a better solvent of the active principle than water,—which may be questioned. It is occasionally given to children affected with ordinary catarrh, in the dose of a teaspoonful or two, but is not much prescribed by the physician. It is an officinal preparation in the Pharmacopœia of the United States, but not in that of any British College.

14. IN′ULA.—ELECAMPANE′.

Elecampane is the root of *Inula Helenium*, SEX. SYST. Syngenesia Polygamia Superflua: NAT. ORD. Compositæ Asteroideæ; a large handsome plant, which is indigenous in various parts of Europe; flowering in June and July. It has become naturalized in this country, and is cultivated in the gardens, and for medical use. The root is officinal in the secondary list of the Pharmacopœia of the United States.

As met with in the shops, the dried root is usually in longitudinal or transverse slices, of a yellowish-gray color, an aromatic slightly camphoraceous odor, and a warm, aromatic, and bitter taste. The medical virtues are imparted both to alcohol and water. The root has been analyzed by different chemists, and found to contain, amongst other constituents, a peculiar aromatic principle, to which the names *Helenin* and *Elecampane Camphor* have been given; resin, the taste of which is bitter, nauseous, and acrid; an amylaceous substance termed *Inulin* and *Alantin;* and bitter extractive. From this analysis it can be understood that Inula possesses the medical virtues of the aromatic tonics; but it is rarely used except as an excitant expectorant in pulmonary catarrh, and in bronchitic affections, in which there is no febrile or inflammatory excitement. It has had some reputation as an emmenagogue, but has outlived it. It may, like other aromatic tonics, act indirectly in asthenic cases of amenorrhœa. The decoction is the form commonly prescribed. (*Inul.* ℥ss; *Aquæ* Oj.—Dose, f℥i to f℥ij.)

15. CREASO'TUM.—CRE'ASOTE.

Creasote—whose properties are described under Excitants—has been used as an excitant expectorant in phthisis; but the results have been discordant, as might have been anticipated in so intractable a disease. On the whole, its employment has been productive of but little advantage. It is probable, however, that where there is much secretion from the bronchial mucous membrane it may be of service; yet in these cases, Tar-water, *Aqua picis liquidæ*, which is probably mainly indebted for its efficacy to the creasote it contains —has been preferred by some.

When in the distillation of coal tar, the last portion of the volatile oily product is collected apart and left to stand, a quantity of solid, crystalline matter separates, which is principally composed of Naph'thaline. This substance forms large, colorless, transparent, brilliant, crystalline plates, that exhale a faint and peculiar odor, which has been compared to that of narcissus. It melts at 176°, and boils at 413°. It is insoluble in cold water; but soluble to a slight degree at a boiling temperature. Alcohol and ether dissolve it readily. It has been given by M. Dupasquier as an excitant expectorant in chronic bronchitis, in the dose of from 8 to 30 grains in emulsion or syrup, repeated at intervals of a quarter of an hour, until a copious expectoration supervenes. In psoriasis and lepra vulgaris, an ointment, composed of two parts of concrete naphthaline to 30 of lard, proved successful, according to M. Emery.

Under the names Naphtha, and *Wood Naphtha*, the *Pyroace'tic spirit*, *Pyroace'tic ether*, or *Ac″etone*, has been recommended in pulmonary consumption by Dr. John Hastings and others; but the evidence is far from establishing that it is possessed of more efficacy than creasote and the articles just mentioned. It is obtained by carefully distilling a mixture of crystallized acetate of lead and quicklime, and rectifying the crude spirit by repeated distillations from quicklime. It is a colorless limpid liquid, having a peculiar odor; a density of ·792, and boils at 132°. As found in the shops, however, its density, according to Dr. Bache, is generally not lower than ·820. It mixes with water, ether, and alcohol in all proportions. The dose in which it was used by Dr. Hastings—who proposed it as a cure for pulmonary consumption, but on very inadequate grounds—was from ten to forty drops, three times a day.

It is proper to remark, that there has been much difference of sentiment as to the precise article employed by Dr. Hastings, whether it was *Pyroacetic Ether* or *Pyroxylic Spirit;* and both have, accordingly, been used. It is affirmed, that Dr. Hastings has admitted the latter to have been the agent employed by him, and that a careful examination of the article shows such to have been the case. Undoubtedly, however, most of the trials made, and testimonials published in this country, had reference to the Acetone.

PYROXYLIC SPIRIT—SPIRITUS PYROXILICUS of the Dublin Pharmacopœia—is a product of the destructive distillation of wood.

Like creasote, both may be found serviceable in chronic bronchitis, where an excitant expectorant is needed. (*New Remedies*, 7th edit. p. 649, Philad. 1856.)

II. *Demulcent Expectorants.*

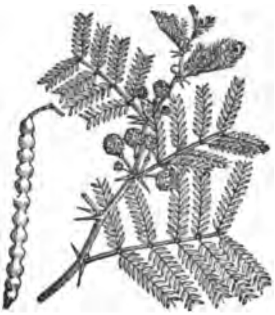
16. ACA'CIA.—GUM AR'ABIC.

Gum Arabic is the concrete juice of *Acacia vera*, and other species of Acacia: SEX. SYST. Polygamia Monœcia; NAT. ORD. Leguminosæ. The species of Acacia, that yield considerable quantities of gum, are besides *Acacia vera*, a native of Arabia, and of Africa from Senegal to Egypt,—*Acacia Arabica*, a native of Senegal, Egypt, Arabia, and India; *A. Karoo*, indigenous at the Cape of Good Hope; *A. gummifera*, a native of Arabia, and of Africa, near Mogadore; *A. Seyal*, native of Egypt and Senegambia; *A. tortilis* and *A. Ehrenbergii*, natives of Arabia; and *A. Senegal*, native of Arabia, and Africa from Senegal to the Cape of Good Hope. The gum generally exudes from the Acaciæ spontaneously, and concretes on the trunk and branches. At times, however, incisions are made to facilitate its flow. It commonly exudes soon after the rainy season has softened the bark, and made it liable to split during the succeeding hot weather. It is exported to this country from the Levant, or some of the other parts of the Mediterranean; from Barbary and Senegal, and from the East Indies, Cape of Good Hope, &c. According to Dr. Pereira, duty was paid, in 1839, on the following quantities imported into England.

Gum from the East Indies, ...	7,869 cwt.
Senegal Gum, ...	24,698
Other sorts of Gum, ...	7,759
Total, ...	40,326

The best gum arabic, often termed *Turkey gum*, is in rounded or amorphous pieces; some of them transparent; others more or less opaque, with deep cracks extending through them. It is usually of a white or yellowish-white color. The powder, into which it is readily reduced, is generally almost pure white. It is inodorous, and has a very feeble taste. Its specific gravity varies from 1·316 to 1·482. It is wholly soluble in water, forming a *mucilage*, which is an officinal preparation. It is insoluble in alcohol, which throws it down from its aqueous solution.

Fig. 53.



Acacia Arabica.

These are the main qualities of the officinal gum arabic. It is apt, however, to be mixed with other varieties of gum, which are described by the different writers on pharmacology, but which demand no detailed account here;—for example: 1. The BARBARY or MOROCCO GUM, supposed to be the produce of *Acacia gummifera*, which is imperfectly soluble in water: 2. GUM SENEGAL, obtained from several species of acacia, which is by no means as easily pulverized as the best gum arabic. 3. EAST INDIA GUM, some of which resembles the best gum arabic; but other portions are far more difficult to pulverize; and 4. CAPE GUM, which is of a very inferior kind.

Gum arabic has been subjected to analysis by M. Guérin, and found to consist of 79·40 per cent. of pure gummy principle, to which the name *Arabin* has been given, and which is wholly soluble; of 17·60 per cent. of water, and 3·00 of ashes. It contains no *Bassorin*, or insoluble gum, which exists in such large quantities in GUM BASSORA, supposed to be the concrete juice of a *mesembryanthemum*.

The essential action of gum arabic is that of a demulcent to the surfaces with which it comes in contact,—soothing the top of the larynx in catarrhal affections, and the soothing influence being extended downwards, along the trachea and bronchia, by continuous sympathy. It is sometimes taken into the mouth in those affections, and permitted to dissolve slowly; and it is the basis of certain lozenges, which have attained celebrity for relieving cough, and facilitating expectoration. It is a valuable agent in many cough mixtures into which fixed oil enters—not simply as a demulcent expectorant, but to suspend the oil in water, and form it into an emulsion. The dose of the powder has been stated at from ʒss to ʒj; but it is obviously an article the dose of which can scarcely be fixed. It is taken *ad libitum*.

MUCILA'GO ACA'CIÆ, MU'CILAGE OF GUM AR'ABIC.—(*Acaciæ* pulv. ℥iv; *Aquæ bullientis* Oss.) It forms part of many mixtures for relieving cough; but is chiefly used as a vehicle to render other substances miscible with water.

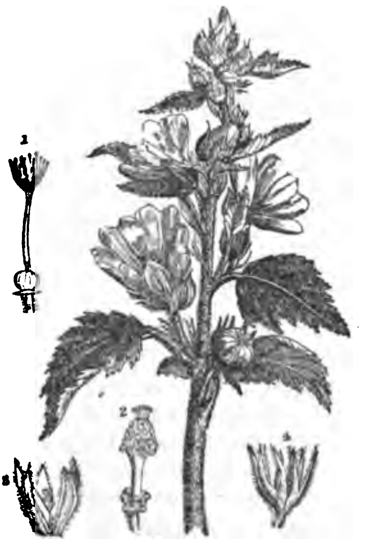
SYR'UPUS ACA'CIÆ, SYRUP OF GUM AR'ABIC.—(*Acaciæ* ℥ij; *Sacchar.* ℥xv;

Aquæ f℥viij. Dissolve first the gum in the water without heat; then the sugar with a gentle heat, and strain.) An ancient and good addition to demulcent mixtures, and useful, in pharmacy, in the preparation of mixtures, pills, &c., but scarcely worthy of being placed, for the first time, in the last edition of the Pharmacopœia of the United States (1851).

Gum Arabic enters into the composition of *Mistura Amygdalæ*, *Mistura Cretæ*, and *Mistura Glycyrrhizæ Composita*, of the Pharmacopœia of the United States.

17. ALTHÆ'Æ FLORES.—MARSHMAL'LOW FLOWERS,
AND
ALTHÆ'Æ RADIX.—MARSHMAL'LOW ROOT.

Fig. 54.



Althæa Officinalis.

1. Styles. 2. Stamens. 3. Outer calyx. 4. Inner calyx.

The flowers and the root of *Althæa officinalis*, Sex. Syst. Monadelphia Polyandria; Nat. Ord. Malvaceæ; an herbaceous perennial, which is indigenous in this country as well as in Europe, growing on the borders of marshes, and especially of salt marshes. The roots, which are mainly used, are collected in autumn; but those that are met with in the shops are chiefly obtained from Europe. They are generally deprived of epidermis, and are of a white color; cylindrical shape; and of about the thickness of the little finger. Their odor is feeble; taste sweet and mucilaginous. They are light, woolly externally, and composed of delicate silky fibres. When chemically examined, they are found to contain a little fecula or starch; nearly 20 per cent. of mucilage; some uncrystallizable sugar; and a crystallizable principle, identical with the *asparagin* of asparagus,—besides other less important constituents.

The virtues of marshmallow are similar to those of gum arabic; and it has been employed in the same cases, especially on the continent of Europe. The *Pâte de Guimauve*, or *Marshmallow Paste* or *Lozenge*, is a favorite remedy in France in hoarseness, and catarrhal affections in general.

There is no officinal preparation of althæa in the Pharmacopœia of the United States: a *Decoction*—Mistura Althææ—is officinal in the Edinburgh Pharmacopœia, and a *Syrup* in the London and the Edinburgh.

18. AMYG'DALA.—ALMONDS.

The Pharmacopœia of the United States, as well as those of Great

Britain and elsewhere, admit both the bitter and the sweet almonds as officinal,—the former being the kernels of the fruit of *Amygdalus communis*—variety *amara;* and the latter of *Amygdalus communis*—variety *dulcis;* a tree in SEX. SYST. Icosandria Monogynia; NAT. ORD. Rosaceæ (Jussieu),—Tribe, Amygdaleæ, which is indigenous in Barbary and Syria, and is cultivated in the southern parts of Europe, whence it has been introduced into this country, but without any advantage, except as an ornament. The general opinion is, that both varieties of almonds are furnished by a tree of the same species; some botanists, however, believe that they are produced by distinct species, and Nies von Esenbeck states, that he had been informed on good authority, that in the Palatinate bitter almonds are not unfrequently gathered from the sweet almond tree. (Christison.)

The almond is so well known as not to require a description. Sweet Almonds are imported from Spain and the south of France. The JORDAN ALMONDS, which are best, come from Malaga; other varieties, —according to Mr. Busby,—are the VALENTIA, BARBARY, and ITALIAN. Bitter almonds are brought chiefly from Mogadore. One variety only is known in commerce. Both sorts, when triturated with water, furnish a copious white emulsion.

The composition of the sweet and bitter almond is interesting to the chemist; but not much so to the therapeutist. The sweet almond contains about 54 per cent. of a bland fixed oil—OLEUM AMYGDALÆ, —24 per cent. of a variety of soluble vegetable albumen, termed *emulsin* or *synaptase*, which is the principle that suspends the oil in almond emulsion; sugar; gum; moisture, and integuments. The bitter almond contains rather less fixed oil and more synaptase, and has, besides, a peculiar principle, called *Amygdalin*, which is interesting in its chemical, but not in any therapeutical relation. It contains, moreover, the elements of a bitter volatile oil, which does not exist in the bitter almond, but is speedily developed when water comes in contact with it. It has been found, that when bitter almonds are deprived of their amygdalin, they are incapable of yielding volatile oil; hence it has been inferred, that water acts upon this principle and generates the oil. Yet amygdalin and water produce no oil, unless emulsin or synaptase are likewise present. Certain it is, that bitter almonds yield no volatile oil on pressure, which ought to be the case did it exist in them; as the volatile oil is soluble in the fixed oil; nor do they yield oil to alcohol or ether. This oil is highly poisonous, and contains hydrocyanic acid, for which—as elsewhere shown—certain preparations from the bitter almonds are occasionally used as substitutes. Amygdalin does not appear to be poisonous when taken pure into the stomach, as there is nothing in that organ capable of acting the part of emulsin. It is said, however, that large quantities given to dogs have produced narcotic effects.

Both varieties of almonds are demulcents by virtue of the oil they contain, and it has been conceived, that the volatile oil, developed by the combination of water, amygdalin, and emulsin, may communicate to the emulsion of bitter almonds virtues similar to those of hydrocyanic acid, and not possessed by the emulsion of sweet almonds;—and hence, that the former may be adapted equally with hydrocyanic acid for cases in which a demulcent expectorant is needed. Often, however, the bitter almond, in pharmaceutical as in culinary preparations, is employed solely to communicate an agreeable flavor to the compound.

MISTU'RA AMYG'DALÆ, ALMOND MIXTURE. (*Amygdal. dulc.* ℥ss; *Acaciæ* pulv. ʒss; *Sacchar.* ʒij; *Aquæ destillat.* f℥viij.) Almond mixture is an elegant demulcent expectorant, much prescribed for allaying cough in catarrhal affections, under the name of *almond emulsion* and *almond milk.* It is a good vehicle for the administration of other agents, as laudanum, paregoric, antimonial wine, &c. It may be taken almost *ad libitum;* but the ordinary dose is from f℥j to f℥iij.

SYR'UPUS AMYG'DALÆ, SYRUP OF ALMONDS. (*Amygdal. dulc.* ℔j; *Amygdal. amar.* ℥iv; *Aquæ* Oiij; *Sacchar.* ℔vj.) This is *syrup of orgeat,* which has been introduced from the French *Codex* into the Pharmacopœia of the United States. It may be used in the same cases as almond emulsion, and is an agreeable drink in sickness.

19. O'LEUM AMYG'DALÆ.—OIL OF ALMONDS.

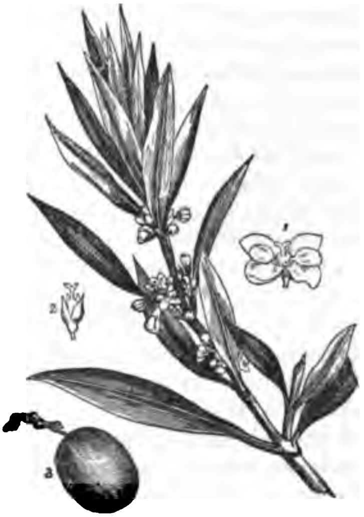
Almond oil is the fixed oil of the kernels of *Amygdalus communis* (p. 259). It is obtained by expression from either bitter or sweet almonds, but more commonly from the former, on account of their cheapness, as well as the greater value of their residuary cake. The average produce is from 48 to 50 lbs. from one cwt. of almonds. From what has been said before, it will be obvious, that in the case of bitter almonds the contact of water must be avoided. As met with in the shops, oil of almonds is transparent and without color, or of a slightly yellow tinge; nearly inodorous, and of a bland, oleaginous taste. It is soluble in ether, and in six parts of boiling, or twenty-five parts of cold, alcohol. Its density varies from ·917 to ·920. The cake, left after the expression of the oil, when ground, forms *Almond powder,* which is used for keeping the skin of the hands soft.

Almond oil is sometimes prescribed in the form of the common oleaginous mixture in cases of catarrh, as a demulcent expectorant. (*Olei amygdal.* fʒiij; *Mucilag. acaciæ; Syrup.* āā f℥ss; *Aquæ* f℥ivss. M. Dose, a tablespoonful, when the cough is troublesome.) To this mixture may be added sulphate, acetate, or muriate of morphia, or *Tinctura opii camphorata,* &c., according to the indications. An emulsion might also be made by the substitution of alkalies, or of the yolk of egg, for the mucilage; but neither is so agreeable. Formerly, equal parts of *syrup of violets* or *syrup of roses,* and *almond oil,* was a favorite laxative mixture for infants, and it has been used in the catarrhal affections of that age,—*simple syrup* being substituted for either of the syrups mentioned. At one time, almond oil was more frequently employed than at present in the formation of linctuses to allay cough. Of these, the following is a form; ℞.—*Confect. Rosæ canin.* ℥j; *Syrup. Papaveris; Ol. amygdal.* āā f℥ss. M. Dose; a teaspoonful or two when the cough is troublesome. These linctuses are rarely employed, at the present day, in this country.

20. O'LEUM OLI'VÆ.—OLIVE OIL.

Olive oil is the expressed oil of the fruit of *Olea Europæa*, *European olive;* Sex. Syst. Decandria Monogynia; Nat. Ord. Oleaceæ; a tree which is supposed to have been originally from Asia, but has been cultivated as far back as history extends in the south of Europe. The finest oil is obtained from ripe olives, by crushing them immediately in a mill, and subjecting the pulp or pericarp to gentle pressure. By augmenting the pressure, a somewhat inferior—but still good—article is obtained. An inferior kind is got by pouring boiling water on the residuum, to dissolve its mucilage; and subjecting it again to gentle pressure; and a still stronger pressure forces out a turbid, impure oil, which is fit only for the soap-maker. An inferior oil is likewise obtained by allowing the olives to ferment for some days before they are subjected to pressure. The most esteemed oil is that made in Aix, and termed Provence Oil. Florence Oil or Salad Oil is a fine kind, imported from Leghorn in flasks. Genoa Oil is likewise a fine variety. The Gallipoli Oil, Sicily Oil, and Spanish Oil, are inferior varieties; the last being esteemed the worst of all.

Fig. 55.



Olea Europæa.
1. Corolla. 2. Calyx. 3. Drupe.

The quantity of olive oil consumed is very great. In the year 1839, duty was paid, in England, on 12,374 tons. It is an article so well known as not to need any description. When good, it is almost devoid of smell, and has a bland, slightly sweet taste. Its density at 77° Fahr. is about ·911. It is soluble in one and a half times its weight of ether; and very slightly soluble in alcohol. By exposure to air, it readily becomes rancid, but more slowly than other fixed oils. It is said to be much subject to adulteration with poppyseed oil, rapeseed oil, and other cheap oils; but as these oils congeal less readily than olive oil, the adulteration may be detected by reducing the temperature to the freezing-point; or, the test suggested by M. Poutet, and adopted by the Edinburgh Pharmacopœia, may be used. When pure olive oil is mixed with a solution of mercury in nitric acid prepared by heat, the whole becomes, in a few hours, a firm fatty mass from the action of the hyponitrous acid in the solution. But if even so small a quantity as 5 per cent. of any other oil be present, the consolidation is much more firm and more tardy; and if the proportion amounts to 12 per cent., the foreign oil floats on the surface of a pulpy mass for several days before showing any tendency to concrete. According to M. Diesel, pure olive oil is colored green by common nitric acid; but, if mixed with rape oil, it is rendered of a strong yellowish-gray color.

As a demulcent expectorant, olive oil is used in the same cases and forms of preparation as almond oil.

21. CETA'CEUM.—SPERMACETI.

Spermaceti is a peculiar concrete substance, approaching in character the concrete fixed oils or fats, which is obtained from *Physeter Macrocephalus*, great-headed *Cachalot*, or *spermaceti* or *sperm whale*, ORDER Cetacea, which inhabits the Pacific Ocean, and the Indian and Chinese Seas. It is found in various parts of the animal's body, being dissolved in small proportion in the blubber. The head, however, contains that which we meet with in commerce. It is mixed with oil, in a large cavity in the upper jaw, anterior to, and quite distinct from, the cavity that holds the brain. There are two places in the head which contain it, between which the nostrils pass; and both cavities are divided into numerous cells, which are filled with a milky fluid, amounting, in a large whale, to about 50 cwt. The contents of these cavities are removed by buckets, and boiled, to separate the oleaginous from the solid matter. In this fluid, the spermaceti crystallizes as it cools, and is separated in an impure state by draining off the oil, and subjecting what remains to strong pressure. The crude spermaceti is purified by melting in water, and skimming off the impurities. It is then melted in a weak solution of potassa, and finally melted a third time by a gentle heat; after which, it is solidified in proper moulds, when it forms the spermaceti of the shops. It generally contains a small portion of oil, which may be removed by boiling in alcohol. The spermaceti, then called *cetin*, is absolutely pure.

Spermaceti of the shops is a white concrete substance, of a foliaceous texture, without taste, and almost without smell. It may be readily reduced to powder by the addition of a few drops of rectified spirit. It is insoluble in water; slightly soluble in cold alcohol, but greatly so when the alcohol is at the boiling temperature. It is very soluble in ether, and readily so in the oils—fixed or volatile. It possesses the demulcent properties of the bland fixed oils; but is rarely given internally. When this is desired, it may be made into an emulsion with *yolk of egg*, or *mucilage*, the spermaceti being first pulverized by the addition of a few drops of alcohol.

22. SAC'CHARUM.—SUGAR.

This, in the Pharmacopœia of the United States, is the officinal name for the refined sugar of *Saccharum officinarum*, *Sugar cane.*

Saccharum officinarum ; SEX. SYST. Triandria Digynia; NAT. ORD. Gramineæ, is cultivated in the tropical regions of both the Old and the New World. Its native country cannot now be discovered ; but it is supposed to have come originally from the East. It is the expressed juice of the ripe cane, clarified and allowed to crystallize or grain. The sugar when put in casks and allowed to drain forms **Muscovado, brown, or raw sugar**; and the uncrystallized portion is **molasses**. Six pounds of juice, in the East Indies, and eight pounds in the West Indies, according to Dr. Christison, yield one pound of raw sugar.

Raw sugar contains various impurities, from which it can be separated by elutriation with a little water, solution in water heated by steam, clarification with blood and alumina, filtration through animal charcoal, concentration in *vacuo* at 150°, crystallization, and displacement of the impure syrup in the crystalline mass by passing pure syrup through it. (Mr. Howard, cited by Dr. Christison.) The product is **White Sugar, Refined Sugar, or Loaf Sugar—Saccharum** of the Pharmacopœia of the United States—of which 79 per cent. may be obtained from good Muscovado sugar. The uncrystallizable syrup in this process is **Treacle or Sugar-house Molasses**, *Sacchari Fœx*.

Fig. 56.

Saccharum officinarum.

It is not necessary to describe further the processes for forming various kinds of sugar; or to dwell upon its properties. It may be well, however, to remark, that by the slow evaporation of a solution of sugar in water, a crystalline product results, called **Sugar Candy**. **Barley Sugar** is obtained by evaporating syrup to a state of great concentration, taking care not to empyreumatize it; and then allowing it to cool. **Taffy** is made by evaporating a mixture of sugar and butter; and **Candy** by boiling syrup or molasses for a few minutes, with the addition of a little butter to prevent it from burning, and flavoring with lemon, peppermint, &c., should this be desirable.

Sugar is very soluble in water; and its saturated solution, called **Syrup**, is an officinal preparation. It is also soluble in alcohol; but not in ether.

It is one of the best of the demulcent expectorants, and on that account forms a part of most cough mixtures. In the shape of candies, lozenges, &c., it is much used in cases of tickling cough. A mixture of syrup and olive oil in equal portions is a common prescription in the catarrhal affections of infants; and the various officinal syrups that are used as expectorants, as *Syrupus*, *Syrupus allii*, *Syrupus amygdalæ*, *Syrupus pruni Virginianæ*, *Syrupus scillæ*, *S. scillæ compositus*, *S. senegæ*, and *S. tolutanus*, owe a considerable part of their efficacy to their saccharine constituent.

SYR'UPUS, SYRUP.—(*Sacchar.* ℔iiss; *Aquæ* Oj.) **Simple Syrup** is rarely used alone as a demulcent expectorant, but it forms part of many mixtures that are prescribed for allaying cough.

23. MEL.—HONEY.

It is not yet decided how honey is produced. Whilst the Pharmacopœia of the United States designates it as "a liquid prepared by *Apis mellifica;*" that of London regards it as "juice of flowers deposited in the comb, clarified;" whilst those of Edinburgh and Dublin regard it as "a saccharine secretion." Admitting it to be essentially obtained from flowers, it is doubtless altered in its properties by the secretions of the crop or honey-bag of the bee.

A hive, which has never swarmed, is considered to yield the best honey, which is thence called *virgin honey.* It is collected in various parts of the United States, but that with which the shops of the Atlantic cities is supplied is said to be chiefly derived from Cuba. (Wood and Bache.)

The smell and taste of honey vary according to the flowers whence it has been collected; and the flavor of the admired *Narbonne Honey* is ascribed to the labiate flowers on which the bees have fed. It dissolves readily in cold water, less so in alcohol; contains crystallizable and uncrystallizable sugar, and may be regarded as a concentrated solution of sugar, mixed with odorous, coloring, gummy, and waxy matters. It is said to be occasionally mixed with flour, which may be detected by its insolubility in cold water, and by the blue color produced by the addition of iodine.

Honey is possessed of the same demulcent and other virtues as sugar; but it is more apt to disagree with the bowels. It is not often used as medicine except as an addition to mucilaginous pectoral drinks, as barley-water, flaxseed tea, &c.; to gargles; and to collutories. In domestic practice, it is, at times, mixed with flour, and spread on linen or leather, to promote the maturation of boils.

MEL DESPUMA'TUM, CLAR'IFIED HONEY.—(Honey melted by means of a water-bath, and the scum removed.) Exposure to heat renders the honey so fluid, that the wax and other light impurities rise to the surface and may be skimmed off. Heavier impurities sink to the bottom.

Honey enters into the composition of *Confectio aromatica*, *C. Opii*, *Mel Boracis*, *M. Rosæ*, *Oxymel Scillæ*, *Pilulæ Ferri Carbonatis*, and *Tinctura Opii Camphorata* of the Pharmacopœia of the United States.

24. GLYCYRRHI'ZA.—LIQ'UORICE ROOT.

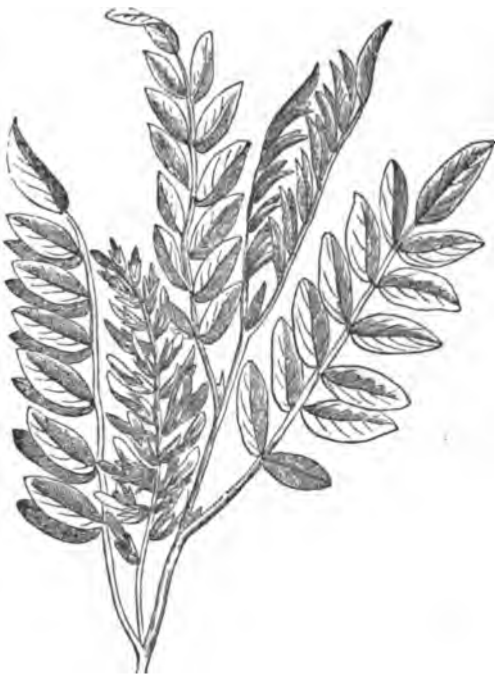
Liquorice root is the root of *Glycyrrhiza glabra*, *Common Liquorice;* SEX. SYST. Diadelphia Decandria; NAT. ORD. Leguminosæ; a perennial herbaceous plant, which is indigenous in the south of Europe, and is cultivated at Mitcham, in Surrey, England, and at other places, for medicinal use. Much of the root which is imported into this country is said to come from the ports of Messina and Palermo in Sicily.

LIQUORICE ROOT, *Stick Liquorice* of the shops, is in long cylindrical pieces of varied thickness, from a few lines to more than an inch; of a grayish-brown color externally, and yellow internally. It has little or no odor, but a remarkably sweet taste, with a slight degree of acrimony. Its main chemical constituents are *Glycyrrhizin*, *Glycion* or *Liquorice Sugar*, which belongs to the uncrystallizable sugars, that are not susceptible of vinous fermentation; and a resinous oil, to which it owes the slight degree of acrimony which it possesses. The acridity seems to be seated in the epidermis, so that, for medical use, the epidermis should be removed. The active principle is soluble in water.

It is one of the most agreeable demulcent expectorants, and is generally given in the form of decoction, either alone or combined with other demulcents. It is not often, however, prescribed by the practitioner; and as a domestic remedy is more used in the form of the extract.

It enters into the composition of *Confectio Sennæ*, *Decoctum Sarsaparillæ Compositum*, *Extractum Sarsaparillæ Fluidum*, *Infusum Lini Compositum*, *Pilulæ Hydrargyri*, and *Syrupus Sarsaparillæ Compositus* of the Pharmacopœia of the United States.

Fig. 57.



Glycyrrhiza glabra.

EXTRAC'TUM GLYCYRRHI'ZÆ, EXTRACT OF LIQ'UORICE.—*Liquorice Juice*, *Spanish Juice*, *Italian Juice*, *Black Sugar*, is amongst the preparations in the London and Dublin Pharmacopœias; but as it is altogether imported into this country, it has been properly placed in the Materia Medica list of the Pharmacopœia of the United States. It is prepared in the same manner as the ordinary watery extracts, by boiling the root, and evaporating the strained decoction. Spanish juice is said to be prepared in Catalonia from *Glycyrrhiza glabra;* in Italy, from *G. echinata.* About 4059 cwt. of foreign extract of liquorice, according to Dr. Pereira, paid duty in England in the year 1839.

That which is used in this country is said to be brought from Leghorn and Messina. It comes in cylindrical or flattened rolls, covered with bay leaves, and when good is very black, dry, brittle, and entirely soluble in water. It is rarely, however, wholly pure, as usually met with. REFINED LIQUORICE is obtained by dissolving the imported extract in water, filtering the solution, and evaporating. The PONTEFRACT or POMFRET LOZENGES are made of refined liquorice.

Extract of liquorice is taken into the mouth, and allowed to dissolve slowly as a demulcent expectorant in cough.

MISTU'RA GLYCYRRHI'ZÆ COMPOS'ITA, COMPOUND MIXTURE OF LIQUORICE.—(*Glycyrrhiz.* [extract.] pulv.; *Acaciæ* pulv.; *Sacchar.* āā ℥ss; *Tinct. opii camph.* f℥ij; *Vin. antim.* f℥j; *Sp. æther. nitric.* f℥ss; *Aquæ* f℥xij. Rub the liquorice, gum arabic, and sugar, with the water gradually poured upon them; then add the other ingredients, and mix.)

This is the well-known pectoral, commonly designated *Brown mixture*, and is well adapted for the cases in which cough mixtures are ordinarily prescribed. The dose is f℥ss. A fluidrachm or a teaspoonful may be given to a child, two or three years old. Before using it, it should be well shaken, so as to mix intimately the more potent ingredients.

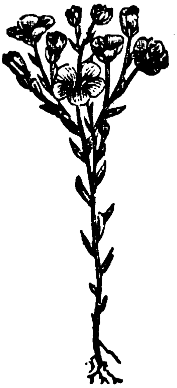
TROCHIS'CI GLYCYRRHI'ZÆ ET O'PII, TROCHES OF LIQUORICE AND OPIUM.—(*Opii* pulv. ℥ss; *Glycyrrhiz.* pulv., *Sacchar.* pulv., *Acaciæ* pulv. āā ℥x; *Ol. Anisi* fʒij.) These lozenges combine the demulcent virtues of liquorice, sugar, and gum arabic; and the anodyne properties of opium. They are, consequently, well adapted to allay cough, where opium is admissible. Each lozenge contains about one-seventh of a grain of opium.

A preparation similar to these troches is known in Philadelphia under the name of *Wistar's Cough Lozenges.*

25. LINUM.—FLAXSEED.

Flaxseed, *Linseed*, or *Lintseed* is the seed of *Linum usitatissimum*, *Common flax;* SEX. SYST. Pentandria Pentagynia; NAT. ORD. Lineæ,—Linaceæ (Lindley), an annual plant, extensively cultivated in various parts of the globe, which flowers in June and July, and the seeds of which ripen in August. Both the seeds and their expressed oil are officinal. The seeds are oblong, oval, flattened on the sides, with acute edges, pointed at one end, smooth, glossy, brown externally and yellowish-white within, devoid of smell, and of an oily mucilaginous taste. The coat of the seeds is mucilaginous; the nucleus oily. The entire seed yields about a sixth of dry mucilage, and a fifth of oil. *Linseed meal* is the *oil cake*, which remains after the expression of linseed oil, ground to powder. It abounds in mucilage, and is extensively used in the formation of poultices. For this purpose it is better than the ground seeds, which contain oil, and are liable to become rancid.

Fig. 58.



Linum usitatissimum.

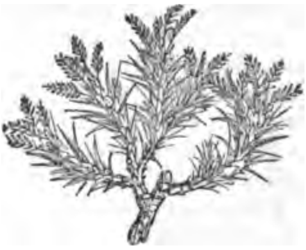
Flaxseed is not given in substance. The most common form of administration as a demulcent expectorant is the

INFU'SUM LINI, INFU'SION OF FLAXSEED.—(*Lini* ℥ss; *Glycyrrhiz.* cont. ʒij; *Aquæ bullient.* Oj.) Flaxseed tea is a common domestic remedy in catarrhal affections. The formula given above is officinal in the Pharmacopœia of the United States. It is rendered more palatable by the addition of sliced lemon. The dose may be from f℥ij to f℥iv; but it is generally taken *ad libitum.*

26. TRAGACAN'THA.—TRAG'ACANTH.

Tragacanth or *Gum Tragacanth* or *Gum Dragon* is referred to *Astragalus verus* by the Pharmacopœia of the United States; but it is generally supposed to be the concrete juice of various species of Astragalus; Sex. Syst. Diadelphia Decandria; Nat. Ord. Leguminosæ. The greater part, however, of that which is met with in commerce would seem to belong to *Astragalus verus*, a native of Persia. *Astragalus gummifer*, of Lebanon; *A. Creticus*, of Mount Ida in Crete, and *A. strobiliferus* of Koordistan, are also said to produce it. It exudes spontaneously from the stems and branches during the summer season, and concretes there. It is imported from Smyrna and other ports of the Levant. The entries of tragacanth for home consumption in Great Britain, in 1831 and 1832, were, according to Mr. McCulloch, at the rate of 45,836 lbs. a year.

Fig. 59.



Astragalus verus.

As seen in the shops, it is in small contorted pieces of the most irregular shapes; of a yellowish-brown color; semi-transparent or translucent; hard; tough; devoid of odor and taste; difficult of pulverization, except at a temperature of between 100° and 120° Fahr. (Christison), or at a freezing temperature (Wood and Bache). Its specific gravity is 1·384. With cold water as well as hot, it forms a mucilage; but a portion only appears to be dissolved; the remainder, after a time, being precipitated. Chemical analysis shows it, indeed, to be composed of common gum, identical with, or at all events resembling, the *Arabin* of gum arabic, which has been termed *Tragacanthin* or *Adragantin*, *soluble gum*, or *Arabin of tragacanth;* and of *Bassorin* or *insoluble gum of tragacanth;* the former, according to one analysis, constituting 57; the latter 43 per cent. Gum tragacanth is wholly insoluble in alcohol. From its property of swelling up in water, and forming a soft adhesive paste, it is much used in the shop of the apothecary for pasting labels, &c.

Dr. Pereira describes two kinds of tragacanth,—Flaky or Smyrna Tragacanth,—that usually found in English commerce, and which occurs in moderately large, broad, thin pieces, marked with arched or concentric elevations; and the Vermiform or Morea Tragacanth, common on the continent of Europe, and occurring in small twisted, filiform, spiral pieces.

Tragacanth possesses the same properties as gum arabic, but it is very rarely employed as a demulcent. It is more commonly used as a means of administering heavy powders by reason of the great viscidity it imparts to water; and, in pharmacy, in the formation of troches or lozenges. Should it be desirable to administer the powder, the dose may be from ʒss to ʒij. Pulvis Tragacanthæ Compo-

SITUS of the London and Edinburgh Pharmacopœias, which consists of *tragacanth*, *gum arabic*, *starch*, and *sugar*, is chiefly used as a vehicle for the exhibition of heavy active powders to children; and is occasionally given as a demulcent.

MUCILA'GO TRAGACAN'THÆ, MU'CILAGE OF TRAG'ACANTH.—(*Tragacanth.* ℥i; *Aquæ bullient.* Oj.) This mucilage is rarely given internally. It is chiefly used in Pharmacy in the formation of troches or lozenges, as of *Trochisci ipecacuanhæ*, *T. magnesiæ*, *T. menthæ piperitæ*, and *T. sodæ bicarbonatis*, of the Pharmacopœia of the United States.

Tragacanth enters into the composition of *Pilulæ Ferri Iodidi* of the Pharmacopœia of the United States.

27. SES'AMUM.—BENNE.

Benne, which is in the secondary list of the Pharmacopœia of the United States, is the leaves of *Sesamum Orientale* or *Benne plant;* SEX. SYST. Didynamia Angiospermia; NAT. ORD. Bignoniæ, Pedaliaceæ (Lindley), an annual plant, which is a native of India, but has been cultivated in various parts of the world; and is supposed to have been introduced from Africa into the Southern States, as well as into the West Indies, by the negroes.

The seeds afford, on expression, a fixed oil—**O'LEUM SES'AMI** or *Benne oil*—which is in the secondary list of the Pharmacopœia of the United States. It resembles olive oil in its properties, and is used for the same purposes.

When one or two fresh benne leaves are stirred in about half a pint of cool water, a quantity of gummy matter is imparted to the water, which soon renders it viscid. When the leaves are dried, they may be put into hot water. The mucilage, thus formed, possesses the same properties as mucilage of gum arabic; and may be used as a demulcent expectorant.

28. SAS'SAFRAS MEDUL'LA.—SAS'SAFRAS PITH.

The pith of the stems of *Laurus sassafras*—whose general properties are described under EXCITANTS—is met with in the shops in slender cylindrical pieces, which are very light and spongy; and have a mucilaginous taste with the flavor of sassafras. They contain a large quantity of gummy matter, which is imparted to water, so as to form a mucilaginous solution; this is used whenever mucilages are required internally; and, therefore, as a demulcent expectorant. The mucilage may be made for internal use by adding a drachm of the *pith* to a pint of *boiling water;* but it is not often prescribed internally. It is the **INFUSUM SASSAFRAS MEDULLÆ**, *Infusion of sassafras pith*, of the last edition of the Pharmacopœia of the United States (1851), and is most frequently used as a soothing application in ophthalmia.

29. ULMUS.—SLIP'PERY ELM BARK.

The inner bark of *Ulmus fulva*, *Slippery elm*, or *Red elm;* SEX. SYST. Pentandria Digynia; NAT. ORD. Amentaceæ or Ulmaceæ, abounds in mucilaginous matter, which it readily imparts to water. Slippery elm is indigenous in this country, flourishing in every part of the United States to the north of Carolina, but most so in the Western States. The inner bark is found in the shops, freed from the epidermis, in long nearly flat pieces, which may be reduced to powder by grinding. Its smell is peculiar, but not agreeable; and its taste, when chewed, is mucilaginous.

Slippery elm bark is almost always prescribed in the form of tea or infusion. A mucilage may, however, be made by stirring the powder in hot water.

INFU'SUM ULMI, INFU'SION OF SLIPPERY ELM BARK.—(*Ulmi* concis. et contus. ℥j; *Aquæ bullient.* Oj.) This may be taken as a demulcent expectorant in catarrhal affections; but it is not much used.

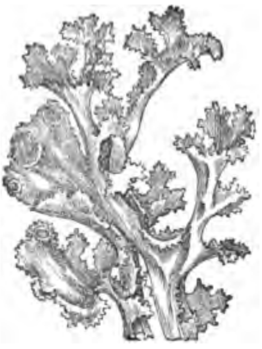
30. CYDO'NIUM.—QUINCE SEED.

The seeds of *Cydonia vulgaris*, *Pyrus Cydonia*, *Common Quince Tree*, Sex. Syst. Icosandria Pentagynia; Nat. Ord. Pomaceæ, which is greatly cultivated in this country, have been admitted into the secondary list of the last edition of the Pharmacopœia of the United States. They are ovate, pointed, plano-convex, inodorous, and nearly insipid. The envelope contains mucilage, which is dissolved by boiling water. The mucilaginous principle is considered by Dr. Pereira to be a peculiar variety of gum, to which he gives the name *Cydonin*. The mucilage, made by boiling two drachms of the seeds in a pint of water, may be used in the same manner and cases as other demulcents. It is rarely, however, given internally. More frequently it is employed, like the mucilage of sassafras pith, in ophthalmia. It is now, says Dr. Christison, "almost abandoned in British practice, and the seeds may without injury be omitted in the Pharmacopœias." Yet, as before remarked, it has been introduced into the last edition of the Pharmacopœia of the United States (1851).

31. CETRA'RIA—ICELAND MOSS.

Cetraria Islandica, *Lichen Islandicus*, or *Iceland moss;* Sex. Syst. Cryptogamia; Nat. Ord. Lichenes,—Lichenaceæ (Lindley), is found in the northern latitudes of both continents, and is said to be abundant on the mountains and in the sandy plains of New England. It is imported into England from Hamburg and Gothenburg, and is said to be the produce of Norway and Iceland. In 1839, 15,938 pounds, according to Dr. Pereira, paid duty in England. As met with in the shops, it is of a brownish or grayish-white color; has little or no odor, and a bitter, mucilaginous, somewhat astringent taste. The dry plant steeped in water, absorbs more than its own weight of the fluid. When analyzed by Berzelius, it yielded 44·6 per cent. of starchy matter, *Lichenin*—3·0 of a peculiar bitter principle, termed *Cetrarin*, the medical properties of which will be considered elsewhere; 7·3 of gum and uncrystallizable sugar; 7 of extractive matter; 36·2 of starchy lignin, besides coloring matter, and various salts.

Fig. 60.



Cetraria Islandica.

Cetraria may be deprived of its bitter principle by a double maceration in water, or in water containing $\frac{1}{33}$ part of an alkaline carbonate. If it be then dried and reduced to powder, it forms a nutritive aliment, which is made into bread by the Icelanders and Laplanders, or boiled with milk.

Cetraria has been much used in cases where demulcents in general are indicated; and, therefore, as a demulcent expectorant. It is employed, also, in pulmonary affections like arrowroot, sago, or tapioca, as a bland, nutritious article of diet, and it does not seem to possess any advantage over those articles. It has been highly extolled in pulmonary consumption; but it is now universally considered to possess no peculiar properties either in that or any other disease. The powder is occasionally—but very rarely—given in the dose of from ʒss to ʒj; and it is sometimes mixed with chocolate, and taken night and morning for breakfast and supper. The most common form of administration is the

DECOC'TUM CETRA'RIÆ, DECOC'TION OF ICELAND MOSS.—(*Cetrariæ* ℥ss; *Aquæ* Oiss. Boil to a pint, and strain forcibly.) The bitter principle or cetrarin is contained in this decoction. It thus possesses demulcent and tonic virtues. The bitterness may, however, be first extracted—as before remarked—by maceration in water, or in a weak alkaline lye. The quantity to be taken during the day, as a demulcent and nutrient, is about a pint in divided doses. It is sometimes mixed with milk.

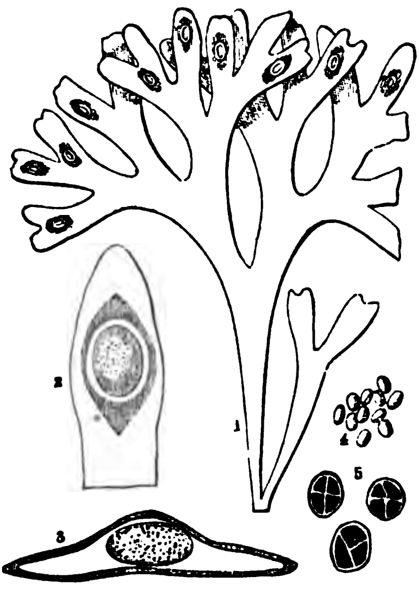
ICELAND MOSS PASTE, made by adding gum arabic and sugar to the strained decoction, and evaporating to the proper consistence, is much used in cases of catarrh.

82. CHONDRUS.—IRISH MOSS.

Carrageen, *Corigeen* or *Irish Moss*, *Chondrus crispus*, *Lichen Carrigeen*, *Fucus crispus*, *Sphærococcus crispus*, *Ulva crispa* or *Chondrus polymorphus;* SEX. SYST. Cryptogamia Algæ; NAT. ORD. Algæ,—Algaceæ (Lindley); is found in the Atlantic Ocean, on the shores of England, Ireland, Western France, Spain, and Portugal, and as far as the Tropics, and is also said to be a native of the United States. For medicinal and dietetic purposes, it is collected on the coast of Ireland (especially in Clare), where it is washed, bleached by exposure to the sun, and dried. In Ireland, it is used by the poor as an article of diet.

When Irish moss is green, it resembles Iceland moss; but, as met with in the shops, it is dry, crisp, and of a yellowish or dirty-white hue, resembling laminæ of horn. It is nearly inodorous, and has a mucilaginous taste. When chewed, it feels like so much cartilage, but by the warmth and moisture of the mouth, it soon loses its brittleness. Its main constituent is a vegetable jelly—which exists in it in the proportion of 79·1 per cent., and which has been considered to consist of *Pectin*, in large proportion—and starch; but which Dr. Pereira esteems a peculiar principle, and calls *Carrageenin*. It contains, likewise, 9·5 per cent. of mucus, and traces of salts.

Fig. 61.



Chondrus crispus.

1. Plant with sori (*natural size*). 2. Segment with sorus. 3. A segment and sorus vertically divided. 4. Seeds or spores. 5. Tetraspores from the sorus (*magnified*).

In order to obtain the jelly of the moss, it is cut small, carefully freed from impurities, boiled with water or milk, if the latter should be desirable, and strained. Von Gräfe obtained from nine ounces of *milk*, boiled with half a drachm of the *moss*, five ounces of jelly; and as much from a drachm and a half of the *moss*, and twelve ounces of *water*. To the jelly thus formed, any dietetic or therapeutical agent may be added.

Irish moss has been recommended under the same circumstances as Iceland moss; and it would appear, that, like it, no more service can be expected from it than from substances that contain a similar principle. Accordingly, few prescribe it with any other view than as a demulcent and nutritious aliment, where such appears to be indicated.

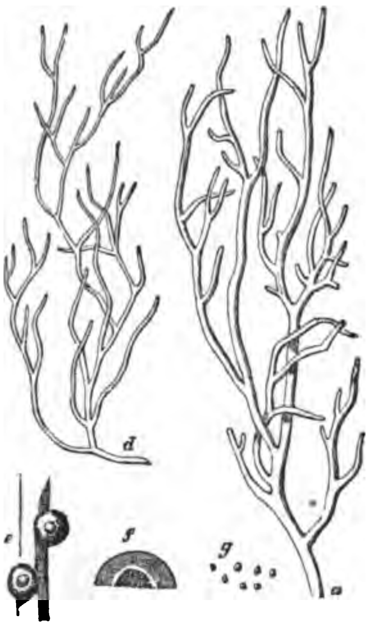
To remove any unpleasant flavor, which the moss may have acquired from impurities, it is advised that, before it is boiled, it should be macerated in water for a few minutes.

CHONDRUS was in the secondary list of the Pharmacopœia of the United States; CETRARIA in the primary; but there was no sufficient reason to assign the one a more important place than the other, and, accordingly, they have both been placed in the primary list of the last edition (1851).

33. FUCUS AMYLA'CEUS.—CEYLON MOSS, MARINE MOSS.

The attention of physicians was first directed to this vegetable, *Plocaria candida* of Nees, by Dr. O'Shaughnessy, of Calcutta. Like chondrus, it belongs to the natural order Algæ; and was first introduced some years ago, from India into England. As met with in the shops, it is white, filiform, and fibrous; and has the usual odor of sea-weeds. Analyzed by Dr. O'Shaughnessy, it was found to be

Fig. 62.



Plocaria candida.

a. Plocaria candida (nat. size). d. Variety β. edulis. e. Part of frond with the coccidia (magnified). f. Section of coccidium. g. Spores.

composed of vegetable jelly, 54·50; true starch, 15; wax, a trace; ligneous fibre, 18; gum, 4; sulphate of soda and chloride of sodium, 6·50; sulphate and phosphate of lime, 1; iron, a trace; loss, 1. When boiled in water, a liquid results, which gelatinizes on cooling. The jelly is prepared like that of chondrus; and it possesses similar medical properties. It is largely employed by the practitioners of India. (See the author's *New Remedies*, 7th edit. p. 391; Philad. 1856.)

The Pharmacopœia of the United States contains in its secondary list:—

34. VI'OLA, *Vi'olet*,—the herb of *Viola pedata.*—SEX. SYST. Pentandria Monogynia; NAT. ORD. Violaceæ,—an indigenous violet, which flowers in May and June. All the violets contain a principle resembling emetia, which has been called *Violine* or *Violia*, and the existence of which in small quantities—as has been supposed—may account for the expectorant properties ascribed to the plant. The author has never known it used.

III. *Nauseant, and Emetic Expectorants.*

Of the mode in which nauseants and emetics probably act as expectorants, a brief notice has been taken already. It is evident, that all agents which are capable of inducing nausea, followed or not by emesis, may be employed as expectorants; and it is not improbable that, if they be given short of inducing nausea, some action of sedation may be exerted by them; and that, therefore, they may be adapted, as sedative expectorants, in cases of pulmonary disease in which the organic actions are over-excited. This, at least, may be the case with the TARTRATE OF ANTIMONY and POTASSA, IPECACUANHA, LOBELIA, &c.; but, on the other hand, if certain agents, as SQUILL, be given in a small dose, they act as excitants, and hence it is important that they should be pushed to an extent but little, if at all, short of inducing nausea.

Of the nauseants, ipecacuanha is most frequently perhaps prescribed as an expectorant, singly, or—what is far more common—in combination with opium; and not unfrequently it is added to demulcent mixtures to aid their expectorant action. The following form, introduced into the edition of the Pharmacopœia of the United States of 1842, is a combination of this kind.

TROCHIS'CI IPECACUAN'HÆ, *Troches of Ipecacuanha.* (*Ipecac.* pulv. ℥ss; *Sacchar.* pulv. ℥xiv; *Marant.* pulv. ℥iv; *Mucilag. tragacanth.* q. s. Each troche to weigh ten grains.) These lozenges are well adapted for inflammatory affections of the lining membrane of the bronchial tubes.

IV. *Topical Expectorants.—Inhalations.*

a. Excitant Inhalations.

85. BENZO'INUM.—BEN'ZOIN.

Of the virtues of this balsam, as an excitant expectorant, mention has already been made. At times, it is employed in the way of vapor; but caution is demanded in inhaling it, as it excites coughing, unless largely diluted with atmospheric air. It ought to be inhaled along with the vapor of water, by breaking benzoin into pieces; putting them into a jar, and pouring boiling water over them. In this manner, the acid rises with the vapor and is taken into the lungs. Its action is excitant to the nerves of the lining membrane of the air-passages, and through them to the respiratory nerves in general; and it has seemed to afford decided relief in asthma depending on some morbid condition approaching paralysis of the pneumogastric nerves. (Dr. A. T. Thomson.) It is said to have proved beneficial even in phthisis after the existence of tubercles had been clearly ascertained; but it can only have acted as a palliative, and probably in the manner already described, through its excitant impression on the respiratory nerves,—expectoration being thus facilitated, and dyspnœa relieved. MM. Trousseau and Pidoux strongly recommend a mode of employing the balsams in chronic laryngitis, which consists in throwing some of the benzoin or the balsam of Tolu on hot coals. They advise this plan in preference to inhalations of boiling water containing the balsam, inasmuch as the patient can remain without fatigue for whole days in a balsamic atmosphere. They affirm that chronic catarrh has been removed in this way, which had resisted the internal use of the balsams. None of the balsams are much used in this manner on this side of the Atlantic, or in Great Britain.

86. ACE'TUM.—VIN'EGAR.

Vinegar is the result of what is termed the *acetous fermentation*, and is impure dilute acetic acid. All liquids, that are capable of the vinous fermentation, are equally so of the acetous, and can, therefore, afford vinegar: hence it is made from various substances;—in France and Spain from the lighter wines; in Great Britain from malt and malt liquors; and in the United States from cider. For the use of the white lead manufacturer, it is said to have been extensively prepared, of late years, from potatoes. (Wood and Bache.)

The difference in the quality of commercial vinegars is very great, some being four times as strong as others. Certain vinegars are, indeed, so weak as not to be fit for the preparation of the Acetum Destillatum; and others are so full of impurities, that they can scarcely be used for making certain officinal preparations. It was not without reason, therefore, that the framers of the Pharmacopœia of the United States (1842) gave the following rules for determining its strength and purity. "One fluidounce is saturated by about thirty grains of crystallized bicarbonate of potassa. It affords no precipitate with solution of chloride of barium, and is not colored by sulphohydric acid." The solution of the chloride of barium detects sulphuric acid, if any be present; and the sulphohydric acid the presence of metallic matter.

The French vinegars—as a general rule—are better for all purposes than the British. The best qualities imported into Great Britain are from Bordeaux, and are known under the name of CHAMPAGNE VINEGAR, although made from other wines. Two sorts of wine vinegar are met with in commerce, made from wines of a corresponding color: that from the red wines may be decolorized by passing it repeatedly through animal charcoal. In this country—as before remarked—vinegar is generally made from cider that has become sour. This is put into a barrel in a warm place, along with good vinegar, or mother of vinegar, which acts as a ferment. The vinegar is ready in the course of a few weeks.

The constituents of vinegar are essentially acetic acid, and water; in addition to which it contains coloring matter, gum, starch, sugar, &c. &c., according to the particular substance from which it has been derived.

As a topical expectorant, it is sometimes used, being put hot into the ordinary inhaler, and in a dilute state. In this manner, it acts as an excitant to the bronchial nerves, and is of service in the same cases as benzoic acid and other balsams, by facilitating the expectoration of mucus, and other secretions that may have collected in the air-passages. It has been of advantage in asthma, and various spasmodic affections of the respiratory organs. It has been advised by Dr. A. T. Thomson, that distilled vinegar should be employed by preference, as common vinegar is apt to contain sulphuric acid.

Vinegar enters into the composition of *Tinctura opii acetata* of the Pharmacopœia of the United States.

87. ACE'TUM DESTILLA'TUM.—DISTILLED VINEGAR.

This is made by distilling, from eight pints of *vinegar*, seven, and preserving these for use. One fluidounce of this should be capable of being saturated by about thirty-five grains of crystallized bicarbonate of potassa.

Distilled vinegar is colorless, or of a yellowish hue; and contains, besides acetic acid and water, a little alcohol, acetic ether, and a substance of a mucilaginous character, which, when the acid is saturated by an alkali, causes the solution to be of a reddish or brownish color. When properly prepared, it has no empyreumatic or other disagreeable taint.

A *diluted acetic acid*, which has the same strength as distilled vinegar, is made by taking the *acetic acid*—**AC′′IDUM ACE′TICUM** of the Pharmacopœia of the United States (1842),—which is prepared by the action of *sulphuric acid* on *acetate of soda*, and diluting it with ten parts of distilled water. This is the **AC′′IDUM ACE′TICUM DILU′TUM** or *diluted acetic acid* of that Pharmacopœia. In the last edition (1851), it is directed to be made by mixing one part of *acetic acid*, of the specific gravity 1·041, with seven parts of *distilled water*. Either this preparation or distilled vinegar may be employed in the way of inhalation.

38. BAL′SAMUM TOLUTA′NUM.—BALSAM OF TOLU.

Balsam of Tolu—whose general properties have been already described—may be used as a balsamic fumigation in the same cases, and in the same manner as Benzoin. The air of the patient's chamber may be impregnated with the vapor, by placing a little of it upon live coals, and allowing the vapor to be diffused in the room; or a drachm or two may be put in boiling water, and the vapor be drawn into the lungs by means of an ordinary inhaler.

39. CHLORIN′IUM.—CHLORINE.

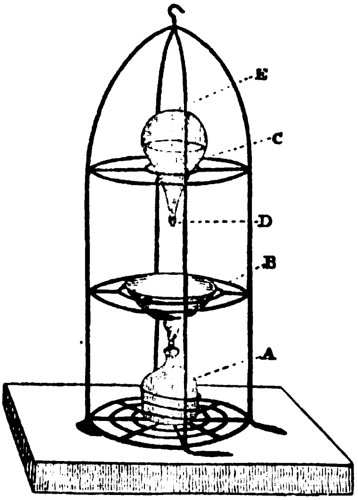
Undiluted chlorine gas is irrespirable, occasioning spasmodic closure of the glottis, and asphyxia. When largely diluted, it is a powerful irritant to the mucous membrane of the respiratory organs, and may develope inflammation in it or in the tissue of the lungs, unless great caution is taken in administering it. When largely diluted, it may induce a salutary excitant influence; and has hence been employed as a topical expectorant of the excitant class. It has been, indeed, affirmed by Dr. A. T. Thomson, that "it is the best topical expectorant and the most salutary excitant to the mucous membrane of the lungs that has yet been inhaled."

Chlorine has been administered as a remedy in phthisis; and many testimonials have been brought forward in its favor. It has been observed, in manufactories in which it is employed, that phthisical patients have experienced decided benefit; but experiments made with it on an extensive scale in large public institutions have not confirmed these favorable reports; and some writers of distinction have affirmed, that it has been prejudicial. In all cases it has to be employed carefully, and experimentally; but no marked benefit can be expected from it in phthisis. It can only be adapted for cases of disease, in which the pathological condition of the bronchial mucous membrane, or neighboring parts, requires the exhibition of an excitant. In this way, it may be occasionally serviceable in chronic bronchitis.

It may be obtained by putting fʒj or fʒij of the saturated solution of the gas in water—the AQUA CHLORINII (*New Remedies*, 7th edit. p. 204, Philad., 1856),—into an inhaler containing about f℥ij of hot water; and placing this in a basin of hot water, or over a lamp, in order to drive off the chlorine. The quantity, thus disengaged, may be inhaled every six hours.

It has been proposed to diffuse it, by means of an appropriate apparatus, in the atmosphere of the sick chamber. For this purpose, any of the acids, as the chlorohydric, may be dropped on a mixture of chlorinated lime, so that the chlorine may be disengaged slowly. An apparatus has been suggested by Dr. Corrigan, that answers this purpose well. It consists of a light open wire frame, about 18 inches high; at the bottom of which is a spirit lamp, A. At the proper height above it is an evaporating porcelain dish, about six inches in diameter, B; and above this is a glass globe, C, with its neck downwards. In the neck of the globe is a cork, D, bored; and through the opening is drawn, moderately tight, a short plug of cotton wick, such as is used in a spirit lamp. In the glass globe at E, opposite the neck, is drilled a pin-hole, to allow air to pass in, according as the fluid within drops out through the neck. To use it, the porcelain dish is filled with hot water, the spirit lamp is lighted, and as soon as the water in the dish has begun to boil, the glass globe containing the chloride—if this be the substance used—is placed as exhibited in the marginal figure. The rate at which the fluid in the globe shall percolate the cotton wick, and drop into the hot water beneath, is easily regulated. Should it not drop with sufficient rapidity, one or two of the threads of the cotton may be removed: if too rapidly, the cork may be pressed in tightly, or one or more additional threads of wick be introduced. Eight ounces of a saturated solution of *chlorinated lime* may be poured into the glass globe; and into the water of the porcelain dish two ounces of *dilute sulphuric acid* of the pharmacopœias. As the solution of the chloride drops, the acid seizes on the lime, and chlorine is evolved in connection with aqueous vapor. In this manner, a sufficient supply of aqueous vapor is given off to prevent any irritation of the lining membrane of the air-passages, whilst the invalid experiences neither trouble nor fatigue.

Fig. 63.



Corrigan's Inhaler.

40. IODIN'IUM.—I'ODINE.

The inhalation of iodine has been recommended as an excitant topical expectorant in the same diseases as that of chlorine. In phthisical affections it has been strongly advised. Sir Charles Scudamore found the addition of a little *tincture of conium* beneficial in subduing the irritating qualities of the gas. His first formula was the following solution of ioduretted iodide of potassium:—(*Iodin.* gr. viij; *Potass. Iodid.* gr. iij; *Alcohol.* f℥ss; *Aquæ destillat.* f℥vss. M. Of this solution, from fʒj to fʒvj, and from twenty to thirty-five minims of a saturated tincture of conium were used in each inhalation.) At the temperature of 90°, the volatile properties of iodine are given off very sensibly, but the conium requires more heat, and one of 120° is not too much for the iodine. Sir Charles has since advised the following :—(*Iodin.; Potass. Iodid.* āā ʒvj ; *Aquæ destillat.* f℥v & ʒvj ; *Alcohol.* fʒij. M.) He prefers to add the conium at the time of mixing the iodine solution with the water, and recommends that it should be a saturated tincture of the genuine dried leaves. In the commencement of the treatment, he advises very small proportions of the iodine mixture ;—for example, from fʒss to fʒj, for an inhalation of eight or ten minutes' duration; and this to be repeated two or three times a day ; of the tincture he directs fʒss,—to be increased if the cough be very troublesome. He soon augments the quantity of the Iodine mixture from fʒj to f℥ss ; but the feelings of the patient will be a great guide as to the proper strength of the inhaling mixture in any particular case.

The author has often used the iodine inhalation in phthisis, but his experience has not been favorable to it; and the same view has been entertained by others. It would seem to be better adapted for cases of chronic bronchitis.

The inhalation may be practised in the method recommended for chlorine. At times, troublesome laryngeal irritation has been caused by it. Used, however, with the conium, or with aqueous vapor in the apparatus recommended by Dr. Corrigan (p. 276), this disagreeable result may be prevented ; and, in this way, it has been found to diminish most remarkably the purulent expectoration of phthisis. It improved the tone of the digestive organs ; alleviated the cough, and acted as a valuable palliative. Dr. Corrigan has had his apparatus at work from eight to twelve hours in the twenty-four ; and his method of managing it is as follows.—At night, when the patient is settling to sleep, the apparatus is suspended from the roof of the bed, and, when once arranged, it continues its work for four or five hours, whilst the patient, asleep, is inhaling the medicated air. In the morning, for three or four hours before the patient rises, it may be again at work, and, if necessary, at mid-day, whilst he reclines on the bed, with curtains drawn round three of the sides. The rate of evaporation, which has been generally found to give a sufficiently strong impregnation to the air, is when the tincture of iodine drops from the cotton wick in the globe at the rate of six or eight drops per minute. At this rate, about six drachms of the tincture will be evaporated in an hour.

41. VAPOR OF BOILING TAR, BURNING WOOL, CREASOTE, &c.

These vapors have been inhaled in cases of phthisis, and in chronic laryngitic and bronchitic affections. In the first disease, no great benefit can be expected from them. In the latter, they may act as excitants to the mucous membrane of the air-passages, and, in certain cases, be beneficial.

Tar vapor was strongly recommended in phthisis by Sir Alexander Crichton; but although it has seemed to act occasionally as a palliative, it not unfrequently causes a temporary increase of cough and irritation. The tar employed should be that used in the cordage of ships; to every pound of which half an ounce of carbonate of potassa is added, in order to neutralize the pyroligneous acid, which is generally found mixed with the tar, and the presence of which may excite coughing. The tar, thus prepared, is placed over a lamp in a suitable vessel, and kept slowly boiling in the chamber night and day. The vessel ought, however, to be cleaned every twenty-four hours; otherwise the residuum may be burned and decomposed, which occasions irritation.

It is a prevalent idea, that the terebinthinate impregnation of the air, which exists in pine regions, is beneficial to the consumptive; and, accordingly, patients are frequently sent to spend some time in such localities.

The **Vapor of Resin** has occasionally been used under similar circumstances; as well as the fumes arising from burning wool that has not been dressed. All these vapors are apt to increase the cough at first; but both it and the expectoration would seem to have been ultimately diminished. They must obviously, however, be uncertain agents in all cases, and not easily regulated; and they cannot, of course, produce any material change in the tuberculous condition.

Creasote, like tar vapor, has been occasionally inhaled in the same pulmonary affections:—five, ten, or fifteen drops, according to the degree of tolerance of the lungs, being dropped into hot water, in an appropriate vessel; and the vapor being inhaled through the tube of an inverted funnel, or by means of any of the inhalers in use. The remarks on the value of tar vapor in phthisis, and other pulmonary affections, apply equally to creasote.

Nitrate of Potassa.—The fumes from the deflagration of nitrate of potassa with paper, have been inhaled with advantage in asthma. For this purpose bibulous paper may be dipped in a saturated solution of the salt, and afterwards dried; and the fumes may be inhaled either by setting fire to the paper on a plate, or rolled up and placed in a candlestick, and permitting the fumes to escape into the room; or by smoking the paper in a tobacco-pipe. The beneficial effects are generally experienced in ten or fifteen minutes.

b. Sedative Inhalations.

42. STRAMO'NIUM.

Every part of *Datura Stramonium*, whose general properties are described under **Narcotics**,—has been smoked for the relief of asthma,—and whilst one part of the plant has, in this form, afforded relief in one case, another has been successful in a second. A case of this kind has been already referred to (p. 242). In this form of administration, a poisonous principle is probably developed; for, according to Dr. Christison, Mr. Morries-Stirling obtained by destructive distillation a poisonous oil, composed of an inert true oil in union with an active principle, probably a modification of *Daturia*.

The author has often seen the inhalation of the vapor of stramonium highly beneficial. Its *modus operandi* is probably through the sedative influence exerted by the narcotic principle upon the nervous centres to which it is conveyed by the blood, as well as upon the ramifications of the pneumogastric nerves distributed to the bronchial tubes,—the sedation being extended to the rest of the nervous system, so that the spasmodic affection is subdued.

Almost all therapeutical writers affirm, that the smoking of stramonium is attended with danger where there is a tendency to encephalic disease, especially apoplexy; and where a plethoric state of the system exists; but the author has never witnessed bad effects from it. Of course, caution is needed in the use of this powerful narcotic as in that of tobacco; for similar acro-narcotic symptoms may be produced by both.

43. TABA'CUM.—TOBAC'CO.

When tobacco,—whose general properties have been described elsewhere (p. 144),—is smoked, not only does the nicotia pass into the lungs, but the empyreumatic oil of tobacco, which is an active poison as formed in the pipe of the smoker, and appears to be nicotia attached to a volatile oil.

The effect of tobacco, when inhaled, is familiar to most persons, for there are probably few men who have not experienced it. It is a powerful sedative, making its impression on the nerves of the bronchial tubes with which it comes in contact, whence the impression irradiates to every part of the system. In this manner it is anti-spasmodic. In spasmodic asthma its good effects have been most witnessed; but it does not agree with all, and requires caution, especially in those who have not been accustomed to its use. Smoking a cigar is said by Dr. Chapman, of Philadelphia, to have been used in a case of croup with success.

The inhalation of ETHER, CHLOROFORM, &c., is described under another head. (See NARCOTICS.)

SECTION III.

AGENTS THAT AFFECT PROMINENTLY THE FOLLICULAR OR GLANDULAR ORGANS.

I. ER'RHINES.

SYNON. *Ptarmica, Sternutatoria, Apophlegmatisantia per nares.*

Definition of errhines—Sternutatories—Modus operandi—Dangers of sneezing—Special errhines.

THIS class of medicinal agents is much less used now than formerly. There are, indeed, few cases in which their employment can be suggested. At one time *errhines* were separated from *sternutatories*,—the former comprising agents, that excite an increased discharge from the Schneiderian membrane; the latter those that provoke sneezing; but the class of errhines is now made to include both, under the definition—"Agents that occasion an increased discharge from the Schneiderian membrane, and sneezing."

When an irritating substance is placed in contact with the Schneiderian membrane, it excites a sensation, through the fifth pair of nerves or nerves of general sensibility, distributed to the nose, and by a reflex action the appropriate muscles concerned in sneezing are thrown into contraction, in order that the source of irritation may be ejected by the anterior nares. At the same time, if the errhine remains for any time in contact with the membrane, a centre of fluxion is established; the follicles augment their secretion; and, if the substance be still more irritating, true inflammation is excited. This effect, of course, takes place more immediately in the part of the mucous membrane with which the errhine comes in contact; but the excitation is extended more or less to the mucous membranes that may be regarded as continuous with that which lines the nasal passages,—for example, that which lines the sinuses and ductus ad nasum. In this way it can be understood, that the operation of an errhine may augment the secretion of tears, and occasion more or less suffusion of the eyes; and, conversely, that an inflamed state of the conjunctiva may give rise to increased discharge of mucus from the lining membrane of the nasal fossæ and sinuses, and to sternutation. A sense of irritation in the nose, inciting to the operation of clearing the nasal fossæ, is a common accompaniment of ophthalmia.

From what has been observed, it is clear, that if an errhine be too strong, instead of increasing the discharge from the Schneiderian membrane, it may arrest even the healthy secretion. This is, indeed, one of the well-known first effects of inflammation of any mucous membrane; and it is not until the inflammation has persisted for some time, that the secretions are materially augmented.

To prevent the induction of inflammatory irritation, the more powerful errhines are always weakened by the addition of some inert powder.

Therapeutical Application of Errhines.

A knowledge of the *modus operandi* of this class of medicinal agents at once suggests the cases, in which they might rationally be had recourse to. They occasion a centre of irritation in the part of the membrane with which they are made to come in contact; a derivation of nervous and vascular action from other parts is thus effected; an increased discharge takes place from the exhalants and follicles of the nasal mucous membrane—although this has probably but little curative agency; and if they excite sternutation, a strong revulsive impression is made.

Possessed of these properties, errhines have been used in *head affections* in general, and especially in *diseases of the eyes* and *ears;* but still, their remedial powers are very limited, and if much sneezing be produced, they may cause more mischief than benefit. It is on this account that they are rarely administered except in popular practice.

Physiologically, sneezing is set up to clear the nostrils from any source of irritation. It is, hence, often excited in the way of an external sensation—that is, by some substance impinging on the Schneiderian membrane. But it often occurs, also, as an internal sensation—that is, produced by some organic change in the mucous membrane itself. Hence, it is a symptom of inflammation of the Schneiderian membrane, as in common cold, and in the catarrh that attends measles.

Dr. A. T. Thomson refers to a case of benefit from sternutation in which this agency appears to have been prescribed empirically. The result may be borne in mind with advantage, as it may attract attention to a cause of cephalalgia, that might otherwise be unsuspected. A lady was afflicted with violent headache, accompanied by the sensation well known by the term *stuffing in the head.* Many remedies were proposed, and tried, but ineffectually. A physician was called in, who prescribed snuff as a sternutatory. It produced violent sneezing, and the ejection from one of the nostrils of a plug of hardened mucus, nearly an inch long; after which, she experienced immediate relief, and, in 24 hours, had perfectly recovered.

From the succussion produced during sneezing, and the compression of the abdominal viscera, it has been advised in popular practice, when torpor of the uterus exists after the extrusion of the fœtus, with the view of exciting that viscus to contraction for the delivery of the secundines; and, at times, it is successful; but an acquaintance with the physiology of sneezing will show, that it may occasionally be productive of mischief, by giving rise to an increased flow of blood to the head by the arteries, and to impeded return by the veins; and thus produce apoplexy, epistaxis, and other head affections. The succussion, too, accompanying it, is evidently improper in pregnancy, and, *à fortiori*, where there is a tendency to abortion; or, where hernia, or aneurismal disease exists. Conradi esteems errhines to be contraindicated when any inflammatory condition is present; but this caution is unnecessary, as it could scarcely happen, that they would be had recourse to, at least before remedies had been employed, which were considered proper for the removal of such condition.

It is probably owing to the apparent violence done to the system, that the custom has so long existed, in certain countries more especially, of offering a benediction to any one who sneezes. Amongst the Teutonic nations, some form of salutation is always bestowed on such occasions. Even a professor, whilst addressing his hearers, is compelled to *bow* to the force of custom when any one of the class executes this physiological act.

It might be agitated here, whether the habitual use of errhines—as of snuff—be prejudicial; but this is a question which belongs more to hygiene than to therapeutics, and has accordingly been investigated in another place. (See the Author's *Human Health*, p. 334, Philad. 1844.)

SPECIAL ERRHINES.

1. VERA'TRUM ALBUM.—WHITE HEL'LEBORE.

The powdered rhizoma of *White Hellebore*—whose characters are described elsewhere—is possessed of very acrid properties when placed in contact with a mucous surface, and acts as a powerful errhine; hence the common name of the root—Niesswurzel, "sneezing root," in Germany—and of the powder—*sneezing powder*, in Great Britain. These properties are dependent upon its active principle, *veratria*.

The action of powdered veratrum is so violent that it requires to be blunted by admixture with some mild powder, as starch, wheaten flour, or liquorice,—at least three or four parts of these powders being required to one of white hellebore powder. Three grains, united with nine grains of starch, snuffed up the nostrils for three evenings in succession, occasion a copious watery discharge from the nostrils. (A. T. Thomson.) In certain chronic encephalic affections, and in amaurosis, it has been used with this view, but it is not often prescribed.

2. VERA'TRIA.

Veratria,—the active principle of *veratrum album*,—is a powerful errhine, the smallest appreciable quantity, applied to the Schneiderian membrane, exciting violent and repeated sternutation. A very minute quantity of the acetate of veratria, placed in the nostrils of a dog by M. Magendie, instantly caused violent sneezing, which continued for a long time.

It has been remarked, that we possess the means of making a certain errhine, always of the same strength, by combining *veratria* with a portion of *starch* sufficient to cover its acrimony; yet it is proper to remark, that it is an article which is frequently adulterated; and it is in this way, that many account for the discordance amongst observers as to its virtues. It is, moreover, so harsh at times in its operation, and if the Schneiderian membrane be abraded, so much inconvenience may result from its absorption, that if employed at all as an errhine, it ought to be so with the greatest caution.

3. HYDRAR'GYRI SULPHAS FLAVUS.—YELLOW SULPHATE OF MERCURY.

Yellow sulphate of mercury, described under EMETICS (p. 130), possesses strong errhine powers, and has the advantage over some others of always possessing the same degree of strength. It is so violent, however, in its operation, that it requires to be mixed with five or six parts of some farinaceous powder, as starch. A quantity of this compound powder, which contains one grain of the yellow sulphate, usually produces a discharge from the Schneiderian membrane, which may continue for several days. It is said to have been found very useful in ophthalmic affections; and as it possesses no narcotic properties, "there can be no doubt," says Dr. A. T. Thomson, "that it is superior to every other errhine in affections of the head."

4. AS'ARUM EUROPÆ'UM.—ASARABAC'CA.

Asarum of the British Pharmacopœias is not identical with asarum of the Pharmacopœia of the United States; the latter being an excitant tonic, and, therefore, not falling under consideration here. The *European asarum* or *common asarabacca;* Sex. Syst. Dodecandria Monogynia; Nat. Ord. Aristolochiaceæ, is a small herbaceous plant, growing in moist hilly woods in England, as well as in many parts of the European continent. The leaves are officinal in the British Pharmacopœias. They are almost inodorous, but have an acrid, aromatic and bitter taste. The root of the shops is about the size of a goose-quill, of a grayish color, quadrangular, knotted and twisted. It has a smell like that of pepper, and a nauseous, bitter, hot, acrid taste; much of its acrimony being lost, however, by drying. The acrid properties of asarum would seem to be mainly dependent upon liquid volatile oil, and a camphoraceous principle. It contains, moreover, bitter extractive.

Asarabacca is an emetic; but is never used as such. It is only employed as an errhine, and is said to be the basis of *cephalic snuff.* When either the powdered leaves or the root are applied to the Schneiderian membrane, they excite sneezing, an increased secretion of mucus, and may even induce a discharge of blood. The quantity used as an errhine is one or two grains of the root, or three or four of the leaves, in some cases of obstinate cephalalgia, chronic ophthalmia, or toothache.

The Dublin Pharmacopœia has a Pulvis asari compositus, composed of *asarum* ℥j; *lavender flowers* ʒj; which is used in the same cases, in the quantity of gr. v to gr. viij.

5. TAB'ACUM.—TOBAC'CO.

Tobacco, in the form of snuff, is a well-known errhine; not, however, habitually employed with that view, but as one mode of inducing pleasurable excitement through its peculiar impression on the olfactory nerves.

In the manufacture of snuff, the tobacco is cut into small pieces; is first fermented by being placed in heaps, and sprinkled with water or a solution of salt—the latter preventing the tobacco from becoming mouldy. The heaps soon become hot, and evolve ammonia. The extent to which this process is permitted to go, varies according to the kind of snuff, from one month to two or three,—the latter being the usual period. It is then ground in mills, or powdered with a kind of pestle and mortar. Some of the snuffs—as the *Scotch*, *Irish*, *Welsh*, and *Spanish*—are high dried. Others—as the different varieties of *Rappee*—are moist.

Of the effects of the abuse of snuff on the system, the author has treated in another work (*Human Health*, p. 334, Philad. 1844). In this place it has only to be spoken of as a therapeutical agent. To those who are unaccustomed to its use, it occasions an increased secretion of the nasal mucus and sternutation. Where slight and transient effects of the kind are needed, snuff may be employed; but it is a far less energetic errhine than others in the list.

Besides the errhines mentioned, others have been occasionally employed.

6. Euphor'bium.—This is the concrete resinous juice of an undetermined species of *Euphorbia*, which is obtained in Morocco, and exported from Mogadore. It causes obstinate sneezing, discharge of bloody mucus, and great torture, if snuffed up the nostrils; and, therefore, requires to be diluted with some mild, feculaceous powder. It is rarely, however, used; and is not in the lists of the Pharmacopœia of the United States.

7. The root of Iris Florenti'na, *Florentine Orris;* Sex. Syst. Triandria Monogynia; Nat. Ord. Iridaceæ. 8. Rosmari'nus, *Rose'mary.* 9. Lavan'dula, *Lavender;* and 10. Orig'anum Majora'na, *Sweet Mar'joram;* Sex. Syst. Didynamia Gymnospermia; Nat. Ord. Labiatæ; have been classed amongst the errhines, and may act as such by virtue of the essential oil which they contain; but they are more employed on account of their aromatic properties as adjuncts to errhines of a more powerful character. Dried lavender flowers are a constituent of ***Pulvis Asari compositus*** of the Dublin Pharmacopœia.

II. SIAL'OGOGUES.

Synon. *Ptyalogogues, Ptyasmagogues, Salivants, Apophlegmatismi seu Apophlegmatisantia per os.*

Definition of sialogogues—Their employment limited—Modus operandi of sialogogues—Mercury a sialogogue—Special sialogogues.

Sialogogues are agents that increase the salivary discharge. The general *modus operandi* of local sialogogues or *masticatories* is analogous to that of errhines. By their excitant properties, they irritate the lining membrane of the mouth; and the irritation, thus induced, is extended along the ducts to the salivary glands; so that not only is the quantity of fluid inhaled from the mucous membranes increased, but salivation results. In this way, depletion follows their employment, and more or less revulsive effect supervenes, which may act beneficially on parts at a distance laboring under disease. Occasionally, also, they may prove useful, as in cases of paralysis of the muscles of the tongue, by their directly excitant properties. It is obvious, however, that they cannot be of benefit except in local palsy of the organ. Where the origin of the disease is cerebral, little or no advantage can be expected from them.

Therapeutical application of Sialogogues.

The employment of sialogogues must necessarily be extremely limited. They are occasionally used as masticatories in *toothache* and in *head affections*,—precisely, indeed, in the cases that are considered to indicate the use of substances, which excite irritation in, and increased discharge from, the lining membrane of the nasal cavities.

By some writers on Therapeutics, mercury has been ranked amongst sialogogues, and salivation is certainly one of the effects resulting from its administration. It is now, however, generally admitted, that this result is never necessary, and that it is rather to be deplored, inasmuch as the increased discharge exhausts and irritates, without producing any benefit whatever. When this potent article of the materia medica is duly exhibited, it induces a new action, not only in the salivary glands, but in every part of the glandular and follicular, and, perhaps of the whole secretory, system; and as this new action is incompatible with the one that may be already existing, the latter yields. In this point of view, therefore, mercury is a revellent; and is referred to elsewhere. Ptyalism may likewise be induced by various other agents,—as by iodine, the preparations of gold, copper, antimony, and arsenic, and it is said to have followed the employment of castor oil, digitalis, and opium. Medicines, which act in this manner, have been termed *specific* or *remote sialogogues.*

SPECIAL SIALOGOGUES.

1. PY′RETHRUM.—PEL′LITORY.

Anthemis Pyrethrum, *Anacyclus Pyrethrum*, *Pellitory of Spain;* Sex. Syst. Syngenesia Polygamia superflua; Nat. Ord. Compositæ, is an inhabitant of Arabia and Syria, and of France, Italy, Germany, and other parts of Europe. The root is the officinal portion; but none of it appears to have been imported into England from the Levant since the year 1836, during which year duty was paid on 420 lbs. (Pereira.) It has, indeed, fallen into disuse, and has been placed in the secondary list of the Pharmacopœia of the United States.

The root, as met with in the shops, is in pieces about the length and thickness of the little finger; of a brown color externally; mottled with black shining spots; breaking with a resinous fracture; and having a radiated structure internally. It is inodorous; and, when chewed, occasions a peculiar sense of heat, pungency, and tingling in the mouth, which continues for some time, and is accompanied by a copious flow of saliva. Its properties appear to be dependent upon a brown acrid resin, an acrid brown fixed oil, and a yellow acrid oil, which have been termed collectively *Pyrethrin:* as, however, Hagen and Schönwald have obtained from it a scentless volatile oil, possessing the peculiar taste of the root, it has been thought probable, that this is the active principle, and that it adheres forcibly to the resin and fixed oil. (Christison.)

Pellitory root is employed almost exclusively as a sialogogue in certain neuralgic affections of the head and face, in palsy of the tongue, and of the muscles of deglutition; and, occasionally, both as a masticatory, and, in the form of infusion, in relaxation of the uvula and isthmus faucium. It has been much used as a masticatory in toothache, as well as in the form of tincture. (*Pyrethr.* p. i; *Alcohol.* p. v.)

2. MEZE′REUM.—MEZE′REON.

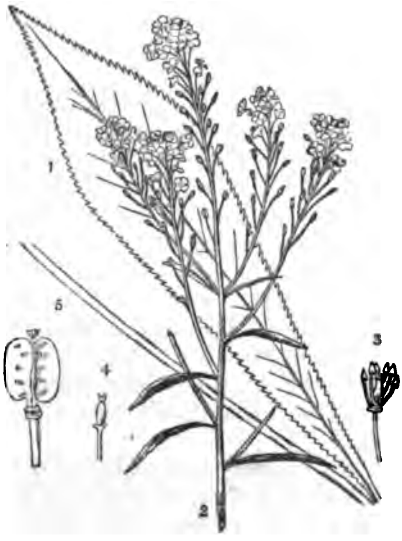
Mezereon bark, whose properties are described elsewhere, owes its excitant action to an acrid resin, by virtue of which it is a good masticatory, and has been used as such in cases of toothache;—a small portion of the bark being kept constantly in the mouth, and the saliva being ejected as it is secreted, on account of the injurious effects likely to be induced on the digestive mucous membrane should it be swallowed. In a case of dysphagia, induced by paralysis of three years' standing, mezereon root was prescribed as a masticatory; and in less than a month the patient recovered the power of deglutition.

3. CAL'AMUS.—SWEET FLAG.

The general properties of the rhizoma of *Acorus Calamus* are described under the head of Excitants. Its medicinal agency is dependent upon volatile oil. When chewed it produces the ordinary excitant effects of the sialogogues in general; hence it is substituted for tobacco by such as are desirous of discontinuing the use of the latter. It need scarcely be said, however, that the two agents resemble each other only in their operation as local excitants. The calamus is possessed of no narcotic properties. It may be used whenever a masticatory is needed.

4. ARMORA'CIA.—HORSERADISH.

Fig. 64.



Cochlearia armoracia.

1. Radical leaf. 2. Raceme. 3. Stamens and pistils. 4. Pistil. 5. Silicle.

Horseradish is the fresh root of *Cochlearia Armoracia;* Sex. Syst. Tetradynamia Siliculosa; Nat. Ord. Cruciferæ or Brassicaceæ;—a native of Western Europe, growing wild on the sides of ditches, and other moist situations; and flowering in June. It is cultivated almost everywhere.

When scraped, it is a well-known condiment; has a pungent taste; and exhales a highly penetrating acrid vapor. These properties appear to reside in an exceedingly pungent, acrid, diffusible volatile oil, which is present in small proportion;—according to one experimenter (Duncan), cited by Dr. Christison, forming not more than four parts in a thousand: whilst another (Gutret) got scarcely a sixth part of that proportion. It is difficult, however, to conceive, that so small a quantity of the acrid principle can produce so much excitation. The odor of the oil obtained without water, is extremely powerful, and like that of horseradish. A single drop is sufficient to impregnate the air of a whole room.

Horseradish has been used as a masticatory in cases of paralysis of the tongue. It powerfully excites the nerves of the lining membrane of the mouth; and, through it, the salivary glands, which augment their secretion. It is by virtue of its excitant agency, that it is serviceable when made into a *syrup*, in certain cases of aphonia, dysphonia, or hoarseness, where the affection is dependent upon want of power in the nerves concerned in phonation, or upon a state of the intrinsic organs of voice, which excitants are capable of benefiting.

5. ZIN'GIBER.—GINGER.

The rhizoma of *Zingiber officinale*—which is described elsewhere—when chewed, occasions an increased flow of saliva. It has been used as a masticatory in paralysis of the tongue and of the muscles of deglutition.

6. TAB'ACUM.—TOBAC'CO.

Tobacco is a well-known masticatory and sialogogue; but it differs from the other articles of the class in possessing peculiar properties, by which it acts, when swallowed, on the nervous system, and—as is shown elsewhere—greatly depresses the powers of the organism. When used, therefore, simply as a sialogogue, the saliva ought not to be swallowed. Indeed, there are few persons, who have been in the habit of chewing tobacco largely, that can swallow any portion of the juice with impunity.

It is sometimes chewed to relieve toothache, and a portion of the relief obtained is, doubtless, owing to the action of the narcotic principle. It is not, however, an agent which is easy of management in those who are unaccustomed to it: and they who are in the habit of chewing it, receive but little if any benefit from it. It is properly considered to be contraindicated in paralysis of the tongue, and of the organs of deglutition. The simply excitant masticatories are to be preferred.

III. DIURET'ICS.

SYNON. *Uretics.*

Definition of diuretics—Their modus operandi—Mental diuretics—Therapeutical employment of diuretics—In dropsies—In various chronic diseases—Special diuretics.

Diuretics are agents that increase the urinary discharge.

Direct diuretics are such as act immediately and specially on the kidney, so as to increase its secretion; and to these the term is more particularly appropriated. As in other cases, however, it has been extended, so as to include any agency, that may indirectly produce diuresis. Thus, diluents may become diuretics, by increasing the mass of the circulating fluid, and of consequence, the quantity of urine;—in other words by occasioning the elimination of that which has been artificially introduced; and, in the same manner, a cool temperature, by diminishing the amount of the cutaneous and pulmonary depurations, may augment that which is effected by the urinary organs. If, too, an inflammatory condition of the kidneys exists, bloodletting, although it diminishes the amount of circulating fluid, may restore the diminished renal secretion;—but it is unnecessary to go into the consideration of the various agencies that may prove indirectly diuretic; they will suggest themselves readily to the pathological inquirer. The object, at present, is to investigate the *modus operandi*, and applicability of substances, that belong strictly to the class of diuretics; and which, if injected into the blood in appropriate doses, seek out the urinary organs, and exert on them their operation. The expression "in appropriate doses," is proper, because many of them, as cantharides, and turpentine, if given in too great quantity, may induce nephritis, and hæmaturia, without in any manner augmenting the urinary depuration.

Under ordinary circumstances, it is necessary that a certain quantity of urea, or its elements should be separated from the blood; otherwise disease and death may ensue. Accordingly, whenever the urinary secretion is suppressed, in protracted or acute diseases, it is an unfavorable, and, in many cases, a fatal symptom; inasmuch, as it exhibits a total revolution in the accomplishment of indispensable functions, and one not likely to admit of restoration. There are, however, anomalous cases on record, in which the urinary depuration has not taken place for years together; and in the *Philosophical Transactions* for 1713, Dr. Richardson gives the case of a youth—seventeen years of age—who had never passed urine, and yet suffered no inconvenience. Where this has resulted from malformation—as in the last case,—it may be conceived that the function might be supplied through some other channel,—knowing, as we do, the surprising instances of a similar kind met with in certain cases of monstrosity; but it is not so easy to comprehend those cases, in which the depuration,—after having been established for a length of time—has been entirely arrested, and with apparent impunity.

Allusion has already been made to the compensation that appears to exist between the two great depurations—urinary and cutaneous. This compensation is such, that if the one be diminished from any cause, the other is proportionably increased; and it is probable, that when the urinary depuration is diminished, some of the principles may pass off by perspiration, as urea has been detected in the fluid of the cutaneous exhalation. Perhaps, too, in those diseases, in which we are in the habit, and with propriety, of regarding suppression of the urinary secretion as a fatal symptom, the mischief arises less from the retention of matters that ought to be evacuated, than from the deranged state of the system—the complete *bouleversement* of functions—which the suppression announces.

Of the different substances, ranked under the head of diuretics, some pass into the mass of blood, and proceed to the kidneys, without experiencing any decomposition; others, on the contrary, undergo changes in the first passages, and it is the result only of such changes, that excites diuresis. To the first class belong potassa, dilute mineral acids, nitrate of potassa, the oils of turpentine, juniper, &c. The feaster on garlic and asparagus is reminded by the odor of his urine, of the kind of vegetable that has ministered to his repast; but these are more properly examples of the separation of the odorous principles in the first passages.

Reference has already been made to the opinion,—that, when acetic acid is united to potassa, as in the acetate of potassa, a separation of the constituents takes place in the stomach, the potassa being set free, and the acetic acid digested,—and it was remarked on that occasion, that as the chlorohydric acid exists in a state of health in the gastric secretions, should any such separation take place, the potassa would be laid hold of by this acid, and chloride of potassium be formed, which would enter the circulation unchanged. The same may be said of the potassa, and its alkaline fellows, when united to other vegetable acids. Our knowledge, however, on this point of animal chemistry, is not very precise, and certain of our ideas are perhaps inaccurate. This seems to be the case in respect to the bitartrate of potassa, on which Dr. A. T. Thomson has the following remarks, when speaking of it as a diuretic. "Its effects in this respect are explained by Dr. Paris on the probability of the decomposition of the salt *in transitu;* and, consequently, the conveyance of the alkaline base to the kidneys. It is possible, that this explanation may be correct; but when we consider that the quantity of alkali contained in the dose of the bitartrate is equal only to five grains, when a scruple of the bitartrate is taken, and that seven grains of the alkali are taken when twenty minims of the liquor potassæ are administered, yet that the effects of the bitartrate are much more considerable in producing diuresis than the liquor potassæ, there is some difficulty in assenting to the accuracy of this explanation."

The comments, previously made regarding the salts formed by a combination of a vegetable acid with an alkaline base, apply to this salt; and, if any decomposition be effected, it must probably be, in part, through the agency of the mineral acid, which is always contained in the gastric juice. In the mode and quantity, however, in which the bitartrate of potassa is usually taken as a diuretic—that is, in solution, in the way of common drink—a portion probably escapes any kind of decomposition, and passes into the blood unchanged, but becomes decomposed in the course of the circulation, as it is not detected in the urine. In the state of solution, it is eminently adapted for ready absorption, and therefore is enabled to pass through the coats of the bloodvessels of the stomach and duodenum, by imbibition,—in the way in which tenuous fluids in general readily enter the circulation.

Of the diuretics, which are set free in the stomach, or, in other words, are separated there from the substances with which they are combined, we have marked examples in the vegetable substances, whose diuretic properties are dependent upon oil or oleo-resin;—as the different turpentines, copaiba, cubebs, juniper berries, &c. Even where essential oil is combined with resin, it is not certain that the resin is not separated from the oil by the digestive process, whilst the latter only is taken into the circulation, and proceeds to the kidney, to excite its appropriate stimulation. In the case, indeed, of every vegetable, a separation must take place in the stomach between the diuretic and the rest of its components; and the same applies to the only animal diuretic in the lists—*cantharis* or *blistering fly*,—the active principle of which—*cantharidin*—is separated during the digestive process; and probably alone enters the circulation, and proceeds to the urinary organs.

Diuretics have been divided into two classes, those which increase the metamorphosis of tissue, or, to employ the language of Dr. Golding Bird, "act as *renal alteratives*" and aid the depuration of the blood; and those which simply increase the quantity of the watery portion of the urine. To the former class, Dr. Bird assigns those agents, which exert no chemical effect on animal matters out of the body,—as squill, copaiba, juniper, digitalis, &c.; but yet are valuable diuretics in dropsy, owing to their greatly increasing the amount of urine discharged. The latter class includes the alkalies, alkaline carbonates, and the salts of the alkalies, which are capable of being decomposed in the body and converted into the carbonate, as the acetates, citrates, tartrates, &c. Dr. Bird believes, that the action of potassa in the organism is similar to that which occurs when the alkali is added to albumen, fibrin, &c., out of it, and that it effects their solution; and he states, that he has confirmed this opinion by absolute experiment. In one case, he proved that the administration of three drachms of acetate of potassa, taken in divided doses in the twenty-four hours, raised the amount of solid matters in the urine from 416 grains—the normal quantity—to 782 grains. So far as the experiment goes, it certainly corroborates the view, that this salt of potassa augments the amount of solid matters in the urine; and it receives still further support from a series of observations on the action of Liquor Potassæ on the urine in health, made by Dr. E. A. Parkes, Professor of Medicine in University College, London. These led Dr. Parkes to conclude, that if the alkaline solution be taken soon after meals, when a copious supply of acid is present in the stomach, its action is that of an antacid. It combines with the acid, and doubtless thus passes into the circulation; but it does not appear to increase either the amount of water, of solids, or of sulphuric acid in the urine. If the Liquor Potassæ be taken into an empty stomach, it passes unneutralized into the circulation, and usually, in from thirty to ninety minutes, an increased flow of slightly acid urine occurs, which contains the whole of the potassa, organic matter differing considerably from that of ordinary urine, and a relatively large proportion of sulphuric acid; the phosphoric acid and the chlorine being less changed. Perhaps—he suggests—an organic acid—not uric and probably not hippuric—is also present; and he accounts for these phenomena as follows:—an albuminous compound, either in the blood itself or in the textures, has become oxidized; its sulphur, under the form of sulphuric acid, has united with the potassa, and, with the changed protein or albuminous compound, is eliminated by the kidneys. The amount of albumen or fibrin destroyed by one drachm of liquor potassæ cannot be considerable, but if the potassa were continued in large quantities, oxidation, he thinks, might probably be pushed to any amount. Further observations are, however, required, especially as Dr. Parkes did not find the same effects from the administration of acetate and nitrate of potassa. When the former salt was given, he was led to infer, that whilst a large proportion of matter was metamorphosed into both uric acid and urea, still the greatest increase was on the admixture of organic products classed under the name of "extractive," and consisting chiefly of creatin, creatinin, uroxanthin, and matter rich in sulphur.

To substances belonging to the latter class of diuretics or renal alteratives, must be assigned an important modifying influence on the system of nutrition, and accordingly their action in this relation is referred to under the head of EUTROPHICS.

As deleterious agents, received into the economy, have been detected in the urine, it has been advised that diuretics should be employed, whenever a poisonous substance has been taken.

Lastly, certain mental emotions may be regarded as diuretics; these are of the same character as the mental cathartics. Fear and anxiety of mind are well-known agents. Dr. Thomson remarks, that various sounds, and even odors, operate, in the same manner through the medium of the nerves; and he refers to Shakspeare, who ascribes this effect to the sound of the bagpipe—

> "And others, when the bagpipe sings i' the nose,
> Cannot contain their urine."

But these are cases, which exhibit the influence of sensations and emotions on the power of retention rather than on that of secretion. The like result, too, is produced by the exciting emotions. Excessive joy has given rise to the same incontinence as excessive dread; a fact well elucidated by Cervantes, in the effect which he describes to have been produced on Sancho's daughter, when the joyful tidings were communicated to her, that her father had been made governor of Barataria!

By occasioning a copious discharge of the more fluid portions of the blood, diuretics are, to a certain extent, evacuants; but they are rarely employed as such, unless for the purpose of occasioning greater activity of absorption, as in cases where an undue exhalation or accumulation of fluid has taken place in one or more of the serous cavities. In other words, they are not often prescribed as depletives, where antiphlogistics are indicated. Their effect is too trivial to make any decided impression.

It is perhaps by their revulsive action, combined with diuresis, that they are beneficial in certain diseases. The diuresis itself is a sufficient evidence of their operation as local excitants, even were we not aware, that nephritis, or hæmaturia, or both, frequently result from their administration in too large a dose,—a fact, which it is important to bear in mind in affections of the kidney, accompanied by inflammation, and diminished urinary secretion, in which, from an attention to the latter circumstance only, their employment might seem to be clearly indicated. In such affections, they could not fail to add to the mischief, and the best diuretics would obviously be—the lancet and the antiphlogistic medication, which, by removing the pathological cause of the diminished secretion, would give indirect occasion to its restoration.

As a class of medicines, diuretics are exceedingly uncertain in their action: "Scarcely can any one be named," says Sir Henry Holland, "on which we may uniformly rely; and the inequalities of action are rarely to be assigned to any known cause. As, however, they belong alike, or nearly so, to all these medicines, whether of mineral, vegetable, or animal kind, we must seek their origin, not in the substances themselves, but in the functions of the kidneys;—liable, beyond all others, to unceasing changes; and from causes and combinations so various (interpreting, as they do, the state of every other organ and function of the body), that we may readily understand how medicines, directed to them, should partake in the same uncertainty."

Therapeutical Application of Diuretics.

Febrile and inflammatory affections.—From what has been said of the properties of diuretics, their therapeutical employment will be intelligible. Much benefit cannot, of course, be expected from them in febrile affections, or in internal inflammations of parts at a distance from the urinary organs: and it would obviously be improper to administer any but simple diluents where the kidney is suffering under inflammatory irritation. It has been already remarked, that as simple evacuants, not much reliance can be placed upon them; we have other depletives infinitely more effective in such cases.

Dropsies.—The chief diseases in which diuretics are prescribed are those of a dropsical character; especially of the abdomen or areolar membrane. By augmenting the secretion from the kidneys, the quantity of circulating fluid is necessarily diminished; imbibition is augmented; the fluid of the dropsy soaks through the parietes of the bloodvessels; and, in this way, such collections may be made to disappear. It is probable, too, that an essential part of the effect is dependent upon the revulsive operation of the diuretic. Acting as a local excitant to the kidney, it occasions an afflux of vital energy to the organ; and thus diminishes the too great exhalation from the vessels of the serous membrane. Reliance is, however, rarely placed upon the administration of diuretics alone in dropsy. The precise pathological condition, which gives rise to it, has to be attentively investigated; and an appropriate system of medication to be united with the diuretic. Thus, the dropsy is often manifestly of an active or sthenic character, so that bloodletting or cathartics, or both, are indicated; and these being premised, more benefit may accrue from the diuresis than would otherwise have resulted. Frequently, in such cases, a combination of agents of another character with diuretics may be prescribed with advantage. Mercury is an excitant of the secretory system; squill is a diuretic; their conjoint action will, therefore, be as follows:—the mercury produces an action of revulsion,—a distraction of vital manifestation from the seat of the dropsical affection to the parts on which it exerts its local stimulation; the exhalation from the serous membrane is consequently reduced even below the healthy point; a similar influence is exerted by the local stimulation of the diuretic, whilst, in addition, under its operation the absorbed fluid is discharged. Hence, a combination of mercury with digitalis, squill, or some other diuretic, is one of the most useful and most common prescriptions in dropsical cases.

It is obvious, that diuretics can never be productive of essential benefit where organic mischief exists in any of the viscera. Impeded circulation in the viscera gives occasion to the worst forms of dropsy, as the visceral mischief does not usually admit of remedy. Of this nature is the organic disease of the kidney, to which attention was originally directed by Dr. Bright, in the first volume of his "*Reports*," and which is distinguished by the coagulable state of the urine,—*albuminuria*. This is often accompanied by dropsy, although not always. In such cases, the author has been very cautious in the administration of excitant diuretics; under the apprehension, that they might add to the irritation already present in the kidneys. It is proper, however, to observe, that they have not been regarded by some as contra-indicated in these very cases. Dr. Christison thinks, that a stimulus of one kind may be employed with impunity, and even with advantage, when an organ is laboring under irritation of a different kind; and he affirms, that diuretics do not augment the quantity of albumen in the urine, the amount of which has been generally regarded as an index of the degree of local irritation. He considers the best combination, in such dropsical cases, to be,—digitalis, a sedative diuretic, with bitartrate of potassa, an excitant diuretic; the efficacy of the diuretic in such cases being increased by the use of an emetic or brisk cathartic.

It has been recommended, of late, by Dr. Christison, that diuretics should be applied externally also, in cases of dropsical effusion. He employs a formula, consisting of equal parts of the tincture of digitalis, squill, and soap; of which two drachms are rubbed upon the abdomen three times a day. Diuresis generally followed.

Rheumatic affections.—Diuretics have been frequently recommended in various chronic diseases, especially of a rheumatic nature. In lumbago and sciatica, the oils of the different terebinthinates, as well as the terebinthinates themselves, have been much used; and, at times, with marked advantage; but their *modus operandi* is probably altogether revellent,—not owing to the diuresis they occasion.

On the whole, the class of diuretics, although often had recourse to by the practitioner, cannot be considered to comprise our most efficacious agents in the management of disease. They are applicable to but few morbid conditions, and many of these can be as well treated by other remedies. Accordingly, they are by no means as often employed at the present day as they were formerly.

SPECIAL DIURETICS.

These may be divided into two classes. 1. *Excitant Diuretics*, and 2. *Sedative Diuretics;* the *former* clearly acting as excitants to the kidneys, and not, therefore, well adapted when there is any inflammatory condition of those organs; the *latter* acting more, perhaps, upon the organic actions generally; diminishing the power of the heart and arteries, and therefore well adapted for sthenic dropsies. These substances seem to act but slightly on the kidneys as true diuretics, and the objection has been made to ranking digitalis amongst diuretics,—that its action seems to consist in removing the cause of the dropsy, the fluid being then carried off in the usual manner; so that it is no more a diuretic than is quinia in dropsies caused by intermittents. (Wöhler, cited by J. Müller.) It is probable, however, that not only digitalis, but the other agents classed as sedative diuretics, are capable of acting directly upon the kidneys so as to increase the secretion from them.

I. *Excitant Diuretics.*

1. JUNIP'ERUS.—JU'NIPER.

The excitant properties of Juniper are described elsewhere. These are shown to be dependent upon its volatile oil—**O'LEUM JUNIP'ERI.** The diuretic virtue is dependent upon the same; and, according to some experiments, in the dose of four drops, which may be given in sugar, it is one of the most certain diuretics. Dr. Christison states, that he has found five minims of the *oil*, mixed with a fluidrachm of *spirit of nitric ether*, given three times a day in any common vehicle, produce diuresis in dropsy, when other means had failed. The berries, when eaten, affect the urinary organs, increasing the secretion from the kidneys; and, in large doses, producing renal and vesical irritation. The urine acquires a violet odor under their use. They are occasionally given as a diuretic in dropsy, but are rarely trusted to alone. They may be rubbed up with sugar, and taken in the dose of a drachm or two, three or four times a day. This, however, is not the form in which they are usually prescribed. The author is constantly in the habit of directing them to be taken in infusion as common drink. This may be made by pouring on an ounce of the berries a pint of boiling water, letting it stand till cold, and taking the whole pint in the course of the twenty-four hours. Where the diuretic agency of bitartrate of potassa seems to be indicated, two drachms of it may be added to the juniper berries prior to infusing them.

SPIR'ITUS JUNIP'ERI COMPOS'ITUS, COMPOUND SPIRIT OF JU'NIPER.—(*Juniper*, contus. ℔j; *Carui* contus.; *Fœniculi* contus. āā ℥iss; *Alcohol. dilut.* cong.; *Aquæ* Oij.)

This spirit, when sweetened, has been regarded as a substitute for *Hollands* and for *common gin*, both of which contain oil of juniper; and hence *gin toddy*, or hot gin and water, is occasionally prescribed to hydropics as a diuretic. The combination of caraway and fennel seeds adapts it more for an excitant and carminative; but still, on account of the juniper berries, it is most commonly used as an adjunct to diuretic mixtures. It is rarely given alone. Its dose is f℥ii to f℥iv; and both it and the spirituous liquors named above may be of service in highly asthenic cases of dropsy.

2. SCOPA'RIUS.—BROOM.

The fresh tops of *Cytisus Scoparius*, *Spartium Scoparium*, *Common Broom;* Sex. Syst. Diadelphia Decandria; Nat. Ord. Leguminosæ, are in the secondary list of the Pharmacopœia of the United States, into which they have been admitted on account of their diuretic properties.

Broom,—a shrub from three to six feet high, flowering in June,—is indigenous in Europe, and cultivated in this country as an ornament to the gardens. The tops have a bitter, nauseous taste; and, when bruised in their fresh state, a strong peculiar odor. The seeds possess similar properties, and their virtues are yielded to both water and alcohol.

Although broom has been placed in the secondary list of the Pharmacopœia of the United States, and is but little prescribed by the physicians in this country, it is highly extolled, and placed in the first rank of diuretics by some practitioners. Dr. Pereira, for example, affirms, that having very frequently employed it in dropsies, he can add his testimony to its powerful effects as a diuretic, and that he cannot call to mind a single case in which it has failed to act on the kidneys. In some cases, it produced a most marked and beneficial influence on the dropsical effusion, and, in his opinion, it is more certain than any other diuretic in dropsies. Owing to its bitter principle, it is at the same time tonic; and consequently adapted for cases in which the union of a tonic and a diuretic is needed, as in the asthenic forms of dropsy. When given in too large a dose, it acts both as a cathartic and an emetic.

The London Pharmacopœia has an Infusum Scoparii (*Scopar.* ℥j; *Aquæ bullient.* Oj); the dose of which, as a diuretic, is f℥j to f℥ij;—a Decoctum Scoparii Compositum (*Scoparii; Juniper.; Taraxac.* āā ℥ss; *Aquæ* Oiss. Boil down to a pint. Dose f℥j to f℥ij): which is a combination of diuretics; and the Dublin Pharmacopœia a watery extract prepared from a decoction of the tops—Extractum Spartii Scoparii—the dose of which is from ʒss to ʒj; but it is rarely prescribed.

3. SCILLA.—SQUILL.

Squill—which has been described under Emetics (p. 139)—has long had the reputation of an active diuretic. As such it has been frequently prescribed in dropsical cases; and, at the present day, is perhaps employed as often as any remedy belonging to the class. It is rarely, however, given alone, being combined either with other diuretics—as digitalis, bitartrate of potassa, or juniper berries,—or with a revellent, as the mild chloride of mercury. It is an excitant diuretic, and therefore less adapted than digitalis for cases in which there is much vascular excitement, especially of the kidneys. Its dose, in substance, is one grain, repeated every four or five hours. At times, its diuretic influence is not exhibited until it has been pushed so as to induce nausea.

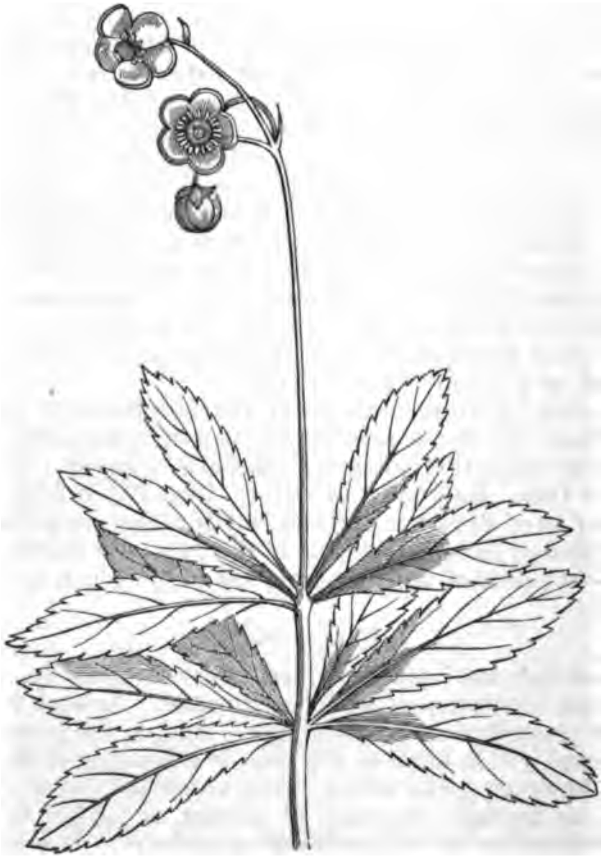
The dose of the **ACE'TUM SCILLÆ** (p. 140), as a diuretic, is fʒss to fʒj; and of the **TINCTU'RA SCILLÆ** (p. 140), from ♏x to ♏xx.

4. CHIMAPH'ILA.—PIPSIS'SEWA.

The leaves of *Chimaphila umbellata*, *Ch. corymbosa*, *Pyrola umbellata*, *Pipsissewa*, *Umbellated Winter-green;* SEX. SYST. Decandria Monogynia; NAT. ORD. Pyrolaceæ, are officinal in the Pharmacopœia of the United States; and the whole herb is in those of Edinburgh and Dublin. It is a beautiful evergreen; and is indigenous in the northern parts of Europe, Asia, and America, flowering in June and July.

Chimaphila has a bitter sweetish taste, with some degree of astringency. Boiling water and alcohol extract the virtues. When subjected to analysis, they yield bitter extractive, resin, tannic acid, gum, lignin, and saline matters. It is not determined in what principle the main activity resides; but, it has been presumed, in the bitter extractive. The constituents would show that the leaves must be tonic, by reason of the bitter principle; and astringent by reason of the tannic acid. They have, likewise, a decided effect in

Fig. 65.



Chimaphila umbellata.

increasing the secretion of the kidneys; and the same marvellous virtues have been assigned to them as to diosma crenata and uva ursi, in diseases of the urinary organs in general! It is in dropsy, however, that the diuretic action of chimaphila has been most frequently serviceable; and it may be beneficially employed wherever a tonico-diuretic is indicated. The author has often used it in atonic dropsy, and with decided advantage. An extensive series of experiments was made at the Bürger Hospital at Pesth, in regard to its remedial powers in dropsy. Within two years, nearly 200 cases are said to have been radically cured by it. It is generally given in decoction; but a watery extract is sometimes prepared from it, which may be prescribed in the dose of 20 or 30 grains, three or four times a day.

DECOC'TUM CHIMAPH'ILÆ, DECOC'TION OF PIPSIS'SEWA.—(*Chimaphil.* cont. ℥j; *Aquæ* Oiss. Boil to a pint.) The whole of this may be taken in 24 hours. Where it is desirable to act, at the same time, on the bowels, senna leaves may be added.

5. CAÏN'CÆ RADIX.—CAÏNCA ROOT.

Radix Caïncæ, R. Chiococcæ, R. Cainanæ, R. Caninanæ, R. Cahincæ, R. Kahincæ, R. Serpentariæ Brasiliensis, Caïnca Root, is not in the British or American Pharmacopœias. It is the root of *Chiococca anguifuga;* Sex. Syst. Pentandria Monogynia; Nat. Ord. Rubiaceæ; a shrub, which grows wild in Brazil, where the root is employed against the bites of serpents. It is of the thickness of the finger, round and knotty; the surface is irregularly wrinkled; the wood tough, and of a whitish color; the smell, especially of the fresh root, disagreeable; and the taste at first like that of coffee, but afterwards nauseous and pungent. The bark of the root is alone active;—the woody portion being inert: its virtues are extracted by water and alcohol. Chemical analysis has shown one of its constituents to be a bitter principle, crystallizable in small, white, shining silky needles, which has an acid reaction, owing to the existence of a peculiar acid —the *Cahincic acid*—and in which the medical virtues appear to reside. It was found by MM. Pelletier and Caventou to contain, likewise, a fatty, green, nauseous odorous substance, which gives the plant its smell; and a yellow, and, also, a viscid coloring matter.

The main therapeutical effect of Caïnca is exerted on the digestive and urinary organs. It occasions watery evacuations, and increased secretion of urine. It has been doubted, however, whether its beneficial effects in dropsical cases have not been dependent rather upon its cathartic than its diuretic agency. The testimony in regard to its action in dropsy has been discordant, but many have deposed very strongly in its favor. It is given in various forms of preparation —powder, infusion, decoction, tincture, extract, syrup, and wine. The Wine is formed from one ounce of the *powdered root* to a pint of *wine;* the Tincture from one part of the *root* to eight parts of *alcohol.* The dose of the powder is from ℈j to ʒss in the 24 hours. It appears, however, that it gives rise to disagreeable symptoms more frequently than the other forms.

It is affirmed, that there is a remarkable analogy between caïnca and apocynum cannabinum.

6. BAL'LOTA LANA'TA.

Ballota Lanata; SEX. SYST. Didynamia Gymnospermia; NAT. ORD. Labiatæ, is a plant which grows exclusively and commonly in Siberia, where it has long had great reputation in dropsy. It has been, of late years, introduced into Russia, Germany, and Italy, but has not been employed in this country. The whole plant is used, except the root; and ample testimony exists to show, that it largely increases the urinary secretion, and has produced unequivocally good effects in dropsical cases. The form of preparation usually prescribed is the DECOCTION. (*Ballot. Lanat.* ℥iss—℥ij; *Aquæ* Oij; boil to a pint. Dose, a cupful, night and morning.)

7. SPIR'ITUS Æ'THERIS NI'TRICI.—SPIRIT OF NITRIC ETHER.

Spirit of Nitric Ether, *Spiritus Nitri dulcis*, *Sweet Spirit of Nitre*, *Nitre Drops*, or—as it is often called—*Nitre*, is a mixture of impure hyponitrous ether and alcohol. According to the process of the Edinburgh Pharmacopœia, it is formed by first preparing nitric or hyponitrous ether, and then diluting this with alcohol. The Pharmacopœia of the United States does not generate the ether by the direct mutual reaction of nitric acid and alcohol; but provides the materials for the formation of the nitric acid, as in the annexed process: Take of *Nitrate of potassa*, in coarse powder, ℔ij; *Sulphuric acid*, ℔iss; *Alcohol*, nine pints and a half; *Diluted alcohol*, a pint; *Carbonate of potassa*, ℥j: mix the nitrate of potassa and the alcohol in a large glass retort, and, having gradually poured in the acid, digest with a gentle heat for two hours; then raise the heat and distil a gallon. To the distilled liquor add the diluted alcohol and carbonate of potassa, and again distil a gallon.

The redistillation from carbonate of potassa is directed to get rid of some acid, which is always contained in the product of the first distillation. Spirit of nitric ether, thus obtained, has the specific gravity 0·834; is colorless; has a peculiar and fragrant ethereal odor, and a pungent, slightly sweet and acidulous taste. It reddens litmus paper, but does not effervesce with carbonate of soda; by keeping, however, it becomes decidedly acid, and may decompose various substances with which it is frequently combined in prescriptions. To obviate this, it may be kept on crystals of carbonate of potassa. It is very volatile, and therefore requires to be preserved in well-stopped bottles. It dissolves in water and alcohol in all proportions. It is very extensively adulterated, sometimes with three or four times its weight of alcohol and water. Dr. Pereira states, that in July, 1840, Mr. Hennell, of Apothecaries' Hall, London, informed him, that it was then selling in the trade at a price, which was but just above that of the duty on the spirit used in manufacturing the genuine article. Wholesale dealers, too, are said to keep two or even three qualities of the preparation. The density and flavor will lead to a tolerably accurate estimate of its goodness.

Spirit of nitric ether decidedly increases the action of the kidneys; yet it is rarely given alone in dropsical cases; and not very often in association. It may be combined with squill, bitartrate of potassa, juniper berries, &c. It must be borne in mind, however, that it is an excitant diuretic; and ought, therefore, to be given with caution in dropsies connected with disease of the kidney. It is best adapted for those of the asthenic kind. Its dose, as a diuretic, is from fʒss to fʒij, in water, repeated two or three times a day.

Spirit of nitric ether enters into the composition of *Mistura Glycyrrhizæ Composita* of the Pharmacopœia of the United States.

SALTS OF POTASSA.

8. POTAS'SÆ BITAR'TRAS.—BITART'RATE OF POTAS'SA.

Bitartrate of potassa, in small doses, is a diuretic, and as such is used in dropsical cases,—rarely alone, sometimes combined with other diuretics, as squill, digitalis, juniper berries, &c.; at others, united with cathartics, to which class of medicinal agents it likewise belongs. (See page 205.)

As a diuretic, it may be given in molasses, in the dose of a scruple to a drachm, repeated two or three times in the twenty-four hours. This is not, however, so good a form as a solution of the salt made by pouring a quart of boiling water on half an ounce of the bitartrate, sweetening with sugar, and flavoring or not with lemon-peel. This may be taken freely as common drink unless it should act too much upon the intestines. The ordinary *imperial* is made by dissolving a drachm, or a drachm and a half, of the bitartrate in a pint of boiling water, and adding lemon-peel and sugar. A *cream of tartar whey* is made by adding about two drachms of the bitartrate to a pint of milk, which may be diluted with water, and drunk as a diuretic in hydropic affections. The salt may also be rendered soluble by borax or boracic acid, and be given in this way.

9. POTAS'SÆ NITRAS.—NITRATE OF POTAS'SA.

Nitrate of Potassa, *Nitre* or *Saltpetre*, occurs in both the inorganic and the organized kingdom. In the former, it is met with in certain soils, efflorescing on the surface; in the latter, it has been found in various plants. For the modes in which it is obtained from its natural sources, as well as artificially, the reader is referred to chemical works. It is found naturally in various parts of the United States, especially in the southern and western portions, where it occurs, for the most part, in caverns of limestone rock, called *saltpetre caves*, and is associated with nitrate of lime. The earths, contained in these caves, are lixiviated; and yield, according to the impregnation, from one to ten pounds of crude nitre to the bushel. These caves are especially numerous in Kentucky, and are said to have furnished a large portion of the nitre used in the United States during the last war. (Wood & Bache.) The greater part of the nitrate of potassa used now in England and in this country is obtained in various parts of the East Indies by a similar kind of lixiviation.

Crude saltpetre, as met with in commerce, requires to be purified for medicinal purposes. This is done by dissolving it in two parts of hot water; filtering the liquor and setting it aside, so that, on cooling, crystals may form.

Nitrate of potassa is also prepared, in many parts of Europe, from soils artificially impregnated with animal matter, or from the mortar of old buildings, especially of the under-ground floor; or from artificial composts, consisting of animal substances, decaying vegetables, ashes and chalk, marl or lime. The nitrate, thus produced in the first place, is the nitrate of lime, which is converted into nitrate of potassa by the addition of carbonate of potassa.

As met with in the shops, nitrate of potassa is tolerably pure. It is in fragments of crystals, of considerable size, which are striated, opaque, colorless, six-sided prisms, terminated by one, two, or six converging planes. The crystals are unalterable in the air, and wholly soluble in water. They have a sharp, cooling taste. The salt is occasionally adulterated with sulphate of potassa, and chloride of potassium. The sulphate is detected by a solution of the chloride of barium, which occasions a white precipitate of sulphate of baryta; the chloride, by the nitrate of silver, which produces a white precipitate of chloride of silver.

Besides its other properties, nitrate of potassa possesses those of a diuretic. It is taken up into the mass of blood, and is separated by the kidneys, so that it may be detected in the urine. It is not often, however, prescribed as a diuretic, in consequence of there being more potent articles of the class. It may be given in the dose of gr. x to ʒss dissolved in water; and its action may be facilitated by taking diluents freely.

Nitrate of potassa enters into the composition of *Collodium*, *Spiritus Ætheris Nitrici*, and *Unguentum Sulphuris Compositum* of the Pharmacopœia of the United States.

10. POTAS′SÆ ACE′TAS.—AC″ETATE OF POTAS′SA.

Acetate of potassa, which was formerly termed *Sal diureticus*, had at one time great reputation for its powers in augmenting the urinary secretion; but it is not now much employed. In large doses—as elsewhere shown (p. 207),—it is cathartic; and may produce a joint cathartic and diuretic action. It was highly thought of by Dr. Duncan, Jr., in dropsy; and M. Alibert considered it the best of diuretics in hydrothorax. It unquestionably is diuretic in small doses; and may, therefore, be serviceable in dropsies; but it is less efficacious, apparently, than bitartrate of potassa, which has now usurped its place.

An acetate may be made by saturating vinegar with the potassa of the carbonate of potassa.

Acetate of potassa—as before remarked—must undergo decomposition in the stomach, if chlorohydric acid be present; and it is affirmed that if none should exist there, the potassa alone enters the circulation, and is separated by the kidney. Were this explanation true, the diuretic agency would have to be ascribed to the potassa, and not to the acetate. The dose, as a diuretic, is from gr. x to gr. xx, given in any diluent or demulcent.

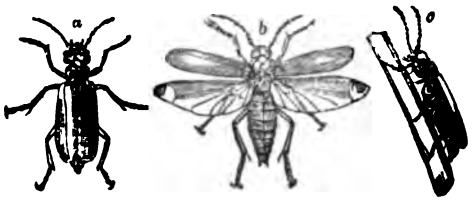
11. SALTS OF SODA.

Many of the salts of soda are diuretic, but none of them eminently so. The *Borate*—SODÆ BORAS—has been sometimes given in dropsy, in the dose of ʒss to ʒj, frequently repeated; the *Carbonate*—SODÆ CARBONAS—in the dose of gr. x to ʒss; and the *Bicarbonate*—SODÆ BICARBONAS—in the dose of gr. x to ʒj; but they are never trusted to alone, and it is doubtful whether they are worthy of being classed amongst the active diuretics.

12. CAN'THARIS.—SPANISH FLIES.

The Spanish Fly, or *Blister Beetle*—CLASS, Insecta; ORDER, Coleoptera, is a native of the south of Europe, and also of Germany and Russia; and it has been met with in England. In the summer of 1837, according to Dr. Pereira, it was abundant in Essex and Suffolk. It is found on species of the Oleaceæ, as the ash, privet, and lilac; and of Caprifoliaceæ—as the elder and lonicera. It inhabits the earth in the larve state; and appears in the form of fly in May, when it infests the trees and shrubs in such numbers, in some of the promenades of Southern Europe, as to drive away the visitors. The flies are caught either in the morning or evening, at which time they are less active, by spreading cloths under the trees, which are strongly shaken or beaten with long poles. The collectors are obliged to have both their faces and hands protected. After they have fallen off, they are killed by being exposed to the vapor of vinegar, hot water, spirit of wine, or oil of turpentine; or by immersing the cloths containing them in hot vinegar and water, and then drying them. At one time, Spain supplied cantharides largely, whence their name *Spanish flies;* but at the present day, they are imported partly from Messina, and partly from St. Petersburg. They are very abundant in the southern provinces of Russia. The Russian flies are the largest and most esteemed. In the year 1839, duty was paid in England on 16,376 pounds. (Pereira.)

Fig. 66.



Cantharides.

Dried Spanish Flies—as met with in the shops—are from six to ten lines long, and about a grain and a half in weight. Their odor is peculiar and disagreeable; their taste acrid and burning. They should be kept perfectly dry by means of well-stopped bottles, and as they are subject to destruction by insects—which devour the vesicating portion with the rest—it may be well to sprinkle them with pyroligneous acid, or with a few drops of strong acetic acid. This last has been found an excellent preservative. When dried, they can be reduced to a powder, which has a grayish-brown appearance, with numberless shining green particles. It is in this condition that they are most liable to adulteration. When in the entire state, their goodness is appreciated by their odor, and freedom from mites and other insects. The powder is sometimes adulterated with powdered euphorbium, especially in the formation of the plaster; and Dr. Pereira affirms, that he has been informed by persons well acquainted with the fact, that it is a common practice, amongst certain druggists, to mix one pound of *euphorbium* with fourteen pounds of powdered *Spanish Flies.*

Cantharides have often been analyzed, but the results obtained by M. Robiquet have received the most attention. He found them to contain, 1. A peculiar principle—*cantharidin*—procured by concentrating an alcoholic tincture obtained by displacement; and setting it aside, so that the cantharidin may crystallize; the blistering property of cantharides is evident in this. 2. A green fatty oil, soluble in alcohol. 3. A fatty matter insoluble in alcohol. 4. A yellow viscid substance, analogous to osmazome. 5. A black coloring matter. 6. A yellow coloring matter. 7. Free acetic and uric acids; and 8. Phosphate of lime, and phosphate of magnesia. The main active constituent appears to be the cantharidin, and it would seem to exist only in the trunk and soft parts of the body, as the other parts have been found inert or nearly so; yet there would appear to be some volatile odorous matter exhaled from the insects, as irritation is produced by sitting under trees on which they are found, or by breathing the vapor from a decoction of them. The virtues of cantharides are yielded to boiling water; but more readily to acetic acid; alcohol, pure and dilute;—ether, and the fixed and volatile oils. Of their effects when applied to the cutaneous surface, mention will be made in another place. Taken internally, they are a violent acrid poison; and have, therefore, to be prescribed with great caution as a medicinal agent. When given in too large a dose, their effects on the genito urinary system are exhibited by the ordinary signs of nephritis and cystitis. By the extension of the irritation through contiguous sympathy, priapism, and sometimes satyriasis are induced in the male; and irritation of the sexual organs, and occasionally abortion in the female. When given to this extent, the renal secretion may be diminished or arrested. In a smaller dose, however, they excite the kidneys to increased action; but although always classed amongst diuretics, they are uncertain in their operation, and are really more beneficial as revellents, through the nephritic irritation which they induce; accordingly, they are less prescribed in diseases, which, like dropsy, require an augmentation of the secretory action of the kidneys, than in neuralgic affections, which, like lumbago and sciatica, are best relieved by revellents. It can likewise be understood, that, by virtue of those same excitant properties, they may be beneficial in paralysis of the bladder, and in cases of atony of the genito-urinary organs in general. Should cystitis be induced by them, it must be met by bloodletting, and by the free use of demulcent drinks.

The dose of the powdered flies is one or two grains, which may be made into a pill with conserve of roses, or extract of taraxacum, and may be repeated twice a day. The tincture, however, is more frequently employed.

TINCTU'RA CANTHAR'IDIS, TINCTURE OF SPANISH FLIES.—(*Cantharid.* contus. ℥j; *Alcohol. dilut.* Oij. Prepared by simple maceration, or by displacement.) The dose is ♏x to fʒj, repeated three or four times a day in some demulcent fluid, as barley-water or flaxseed tea.

The external application of cantharides will fall under consideration elsewhere.

13. CAN'THARIS VITTA'TA.—POTA'TO FLY.

Cantharis Vittata, Lytta Vittata, Potato Fly, is somewhat smaller than *Cantharis Vesicatoria*,—its length being about six lines. The head is of a light red color with dark spots on the top; the feelers are black; the elytra or wing-cases black, with a yellow, longitudinal stripe in the centre, and a yellow margin; the thorax is black, with three yellow lines; and the abdomen and legs, which are of the same color, are covered with an ash-colored down. (Wood & Bache.) The flies appear—as their name imports—on the potato plant, and are first observed about the end of July or the beginning of August. They are found in the morning and evening; and are collected by shaking them from the plant into hot water; after which they are carefully dried in the sun.

Cantharis vittata is a native of the Middle and Southern States. It resembles cantharis vesicatoria in all its properties.

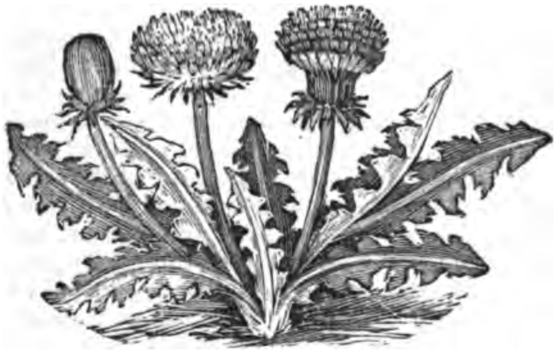
Other species of cantharis are found in the United States, viz.: C. CINEREA, a native of the Northern and Middle States; C. MARGINATA; C. ATRATA, common in the Northern and Middle States, &c. &c.; but C. VITTATA is the only one that is officinal.

14. TARAX'ACUM.—DAN'DELION.

Leontodon Taraxacum, Taraxacum Dens Leonis, Common Dandelion; SEX. SYST. Syngenesia Polygamia Æqualis; NAT. ORD. Compositæ Cichoraceæ; is indigenous in meadows and pastures in most parts of the globe; flowering all the summer. The root is the only part which is officinal in the Pharmacopœia of the United States. When fresh, it is tapering, and abounds with a milky juice, which contains bitter extractive, caoutchouc, resin, gum, sugar, and various salts. It yields its virtues to hot water, and hence the decoction is officinal in the Edinburgh and Dublin Pharmacopœias. The extract is in all the British Pharmacopœias as well as in that of the United States.

Taraxacum is generally regarded as a diuretic and tonic; nay it has even been supposed to be in addition, "aperient, deobstruent, [?] and alterative," but how it produces these effects, and in what cases, we have yet to learn. The author has often administered it, and the results of all his trials induce him to consider, that its remedial agency is extremely restricted. That it is possessed of tonic powers to some extent can no more be doubted of it than of other bitter vegetables; but even in this respect it is far inferior to most of the vegetable tonics. "After having been long abandoned in practice," observes Dr. Christison—"it was resumed not many years ago in this country (Great Britain), and became a fashionable remedy, especially in London, as a tonic aperient and alterative in dyspepsia, and as a deobstruent, and promoter of the biliary secretion in functional as well as organic diseases of the liver. It seems not without its use in dyspepsia and functional biliary derangements; but my own observation of its effects would lead me to infer, that much has been ascribed to the extract of dandelion in these and other affections, which must have been owing to collateral remedies, or to regimen and diet."

Fig. 67.



Leontodon Taraxacum.

It is asserted to have been found beneficial in cases of dropsy dependent upon hepatic obstruction; but it is probable, that farther experience will limit more and more the range of its employment, and that it may ultimately be discarded altogether. It may be prescribed in the form of Decoctum Taraxaci, *Decoction of Dandelion.* (*Taraxac.* contus. ℥ij; *Aquæ* Oij; boil to a pint.) Of this, from one to two fluidounces may be given three or four times a day. It may be associated with other diuretics, as squill, or bitartrate of potassa. The decoction was officinal in the former edition of the Pharmacopœia of the United States (1842), but in the last edition (1851), there has been substituted for it the

INFU'SUM TARAX'ACI, INFU'SION OF DAN'DELION.—(*Taraxac.* contus. ℥ij; *Aq. bullient.* Oj; macerate for two hours in a covered vessel, and strain.) Dose, a wineglassful; or from f℥j to f℥ij.

EXTRAC'TUM TARAX'ACI, EXTRACT OF DAN'DELION.—This extract is made from a decoction of the fresh root. The dose is twenty or thirty grains two or three times a day. The author rarely prescribes it except as an excipient for certain tonic diuretic or other agents that require to be made into pills.

A *Cream of Taraxacum* has been proposed by Dr. Collier, which he prepares in the following manner. Cut the fresh roots of dandelion,—freed from any adherent earthy matter, and previously washed and scraped,—into transverse slices. Sprinkle any quantity of these, whilst moist, slightly with spirit of juniper, and express them in a tincture press. The dose of the cream, thus expressed, is a tablespoonful, or more, twice or thrice a day, which, according to Dr. Collier, will probably produce two or more bilious evacuations in the day. It may be diluted, and given in the form of draught, with any of the diuretic waters and infusions, or with a solution of cream of tartar.

15. O'LEUM TEREBINTH'INÆ.—OIL OF TUR'PENTINE.

The characters of this volatile oil are pointed out under EXCITANTS. In a moderate dose, it is unquestionably an excitant diuretic; yet its properties in this respect are by no means marked, and much of its character may have been derived from the fact, that its use—as well as that of the terebinthinates in general—gives occasion to a violet odor of the urine. It has been administered, however, in dropsy, and in asthenic cases is said to have been occasionally serviceable. It certainly cannot be indicated in dropsy of the active kind accompanied with vascular excitement. In larger doses—as elsewhere remarked—it is a powerful excitant of the abdominal nervous system especially, and hence has been given in cases of tubercular meningitis, or what has been conceived to be the stage of invasion of acute hydrocephalus; but in such case its diuretic operation was not looked to. In cases of lumbago, sciatica, &c., its operation is rather revellent than diuretic;—the excitant or revellent action being exerted on the kidneys. It may be given in the dose of 8 or 10 drops three times a day, dropped on sugar, mixed with molasses, or made into an emulsion with mucilage or yolk of egg.

16. COPA'IBA, and 17. CUBEBS (see EXCITANTS) act much in the same manner as oil of turpentine. They are never given in dropsy as diuretics; but are prescribed to exert a revellent or excitant action on the kidneys. Yet they are often classed amongst diuretics.

The Pharmacopœia of the United States has admitted into the secondary list the following excitant diuretics.

18. CARO'TA,—*Carrotseed*—the fruit of *Daucus Carota;* SEX. SYST. Pentandria Digynia; NAT. ORD. Umbelliferæ—a common plant, growing wild in the United States, and flowering in June and July. The properties of carrotseed are probably dependent upon volatile oil, and are readily communicated to boiling water.

Carrotseed are not much used by the physician; but are frequently prescribed as a domestic remedy in affections of the urinary organs, and in dropsy. The dose of the bruised seeds is from ʒss to ʒj. They are more commonly given in infusion. (*Carot.* ℥j; *Aquæ bullient.* Oj. to be taken during the day.)

19. DELPHIN'IUM, *Larkspur,*—the root of *Delphinium Consolida;* SEX. SYST. Polyandria Trigynia; NAT. ORD. Ranunculaceæ—a species

introduced from Europe, and now naturalized; flowering in June and July. The flowers, seeds, and roots are all said to be diuretic; but the last is the only part that is officinal. It is little if at all used.

20. Erig″eron Canaden′sē, *Canada Fleabane;* Sex. Syst. Syngenesia Superflua; Nat. Ord. Compositæ Corymbiferæ—an indigenous plant, common in the Northern and Middle States; flowering in July and August. The whole plant is officinal. Its main constituents are tannic and gallic acids, bitter extractive, and volatile oil. It is, therefore, astringent, tonic, and, it is affirmed, diuretic; and has been given in dropsy and also in chronic diarrhœa and dysentery; either in powder, the dose of which is ʒss to ʒj; or in infusion. (*Eriger. Canadens.* ℥i; *Aquæ bullient.* Oj. Dose f℥iss to f℥iij.)

21 & 22. Erig″eron Heterophyl′lum, *Various-leaved Fleabane,* and E. Philadel′phicum, *Philadelphia Fleabane;* both of which are called *Scabious*—are found in various parts of the United States, and are used as diuretics in dropsy. They are given in infusion or decoction. (*Eriger.* ℥j; *Aquæ bullient.* Oj. Dose f℥ij to f℥iv, every three or four hours.) The essential oil has been recommended in uterine hemorrhage, in the dose of five drops every two hours; but, as in the case of many other reputed hæmostatics, much careful observation is necessary before its precise efficacy can be determined.

23. Petroseli′num, *Parsley*—the root of *Apium Petroselinum;* Sex. Syst. Pentandria Digynia. Nat. Ord. Umbelliferæ—a native of Southern Europe, but cultivated in gardens everywhere. It contains an essential oil, which is said to communicate to it diuretic virtues. It is also affirmed to be aperient. The strong infusion has been advised in dropsical affections, and in diseases of the urinary organs in which a diuretic is considered to be indicated; but it is hardly ever used, and is not much worth the attention of the practitioner.

24. Ure′a. This immediate principle of the urine of man and animals—as well as its nitrate—has been prescribed as a diuretic in dropsy. The dose is ten grains, four times a day, in water flavored with syrup, diluents being freely allowed to promote its operation. It has, also, been given in albuminuria. It is in the Parisian Pharmacopœia.

II. *Sedative Diuretics.*

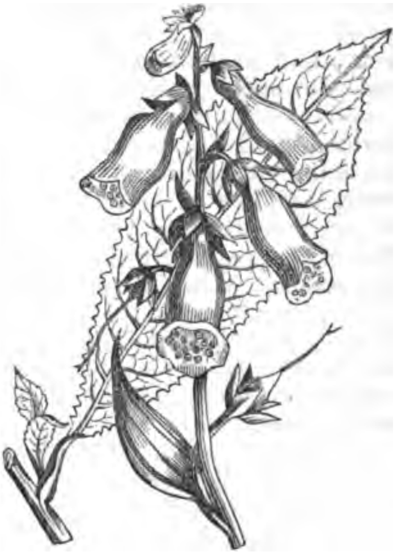
25. DIGITA′LIS.—FOXGLOVE.

Digitalis purpurea, Purple Foxglove; Sex. Syst. Didynamia Angiospermia; Nat. Ord. Scrophulariaceæ, is an herbaceous biennial plant, growing wild in most of the temperate countries of Europe, where it begins to flower in June, and ripens its seed in August and September. In the United States, it is cultivated both for ornament, and medicinal purposes. The leaves are alone officinal in the Pharmacopœia of the United States. The London Pharmacopœia admits, also, the seeds.

Doubts have existed in the minds of many observers in regard to the equal activity of the cultivated and the wild specimens; and, in the doubt, the wild or native plants have been generally preferred.

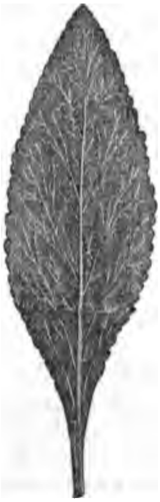
The leaves are usually gathered, as first advised by Dr. Withering, in June or July, when the plant is coming into flower, or soon afterwards. It has been considered, however, unnecessary to restrict the gathering of them to this period, as their bitterness, which may perhaps be some measure of their activity, is very intense both in February and September, and their extract is highly energetic as a poison in the middle of April, before any appearance of the flowering stem. They are considered best in their second year of growth; but not unfrequently the first year's leaves, which are considered to be inferior in activity, are substituted for them. The first year's leaves are often more tapering; but this character is not much to be relied on; and to avoid the substitution it has been deemed the best and safest plan to purchase the fresh leaves at the proper season,—that is, just before or at the period of inflorescence.

Fig. 68.



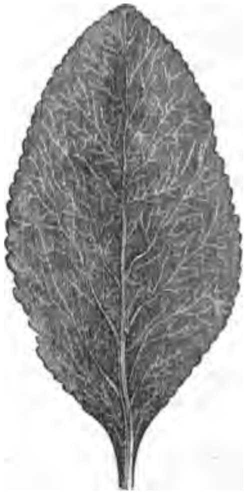
Digitalis purpurea.

Fig. 69.



First year's leaf.

Fig. 70.



Second year's leaf.

They should be dried very carefully, and be preserved from light and air. The midrib and footstalk—being possessed of little or no efficacy—may be removed before drying. In this state, they are of a dull green color, faint odor, and a bitter nauseous taste.

As met with in the shops of this country, digitalis is often in compressed masses, like the dried herbs in general prepared by the Shakers of Lebanon; and these cakes are not unfrequently found to be more or less mouldy; hence this mode of preparation has been properly objected to. (Wood and Bache.) It readily yields its virtues to water and alcohol. It has been repeatedly analyzed, but no important pharmacological information has been obtained. At one time, its active principle was supposed to have been discovered, and was termed *Digitalin;* but the discovery was not confirmed,—the digitalin being esteemed a mixture of other matters. More recently, however, MM. Homolle and Quevenne have succeeded in separating it. When pure, it presents itself in the form of a white, inodorous powder, of an excessively bitter taste, which is especially experienced in the fauces. When disseminated in very small particles in the air it causes violent sneezing. It is scarcely soluble in cold water; rather more so in boiling water; and is soluble in all proportions in dilute and concentrated alcohol. Pure ether only dissolves traces of it; but the slightest addition of alcohol considerably increases its solvent power.

An empyreumatic oil has been obtained from the product of destructive distillation, which is composed, in part, of a highly narcotic crystalline principle. When given to a rabbit, it caused paralysis of the hind legs, convulsions, laborious and rapid breathing, and accelerated action of the heart.

The effects of digitalis on the nervous system, and, through it, on many of the functions, will be described under the head of SEDATIVES. In this place, its action on the kidneys alone falls under consideration. This it exerts both in disease and health, and hence it is properly a direct diuretic.

On inspecting the testimony of various observers in regard to the dropsical cases, in which the diuretic virtues of digitalis have seemed to exhibit themselves, much that appears to be irrational is perceptible. It is well known to be a powerful sedative, and as such is employed whenever the force of the circulation has to be controlled, as in hypertrophy of the heart, and in great vascular excitement, no matter how produced; hence it would seem to be especially adapted for the sthenic forms of dropsy; yet we are told by Dr. Withering —and the remark has been handed down from one therapeutical writer to another—that "it seldom succeeds in men of great natural strength, of tense fibre, of warm skin, of florid complexion, or in those with a tight and cordy pulse." "On the contrary, if the pulse be feeble or intermitting, the countenance pale, the lips livid, the skin cold, the swollen belly soft and fluctuating, or the anasarcous limbs readily pitting under the pressure of the finger, we may expect the diuretic effects to follow in a kindly manner." Yet, if we know anything concerning the *modus operandi* of digitalis, it ought to be adapted for the first set of cases rather than for the latter. Doubtless, it may be itself insufficient to reduce the sthenic condition of the system, and may require the use of an active antiphlogistic treatment, premised or combined with it; yet in the sthenic class of cases its utility has been most manifested. Such is the result of the author's experience. It certainly has not been found by him, as by Dr. Christison, "most serviceable in dropsies associated with an enfeebled state of the constitution." The writer just cited affirms, moreover, that "dropsies depending on diseased heart, are more under its influence than any other kind; and next those connected with diseased kidneys;" but this cannot be regarded as established. No general assertion of the kind is, indeed, admissible, inasmuch as everything will depend upon the degree of cardiac mischief, that gives occasion to the dropsy. Too often, in such cases, all remedies fail; and, in the very nature of the circumstances, they can only act as palliatives.

As a diuretic, digitalis should be given in small doses—for example, one grain of the powder three times a day, until the effect is induced. In all cases, however, the patient should be watched; and if great depression of the powers of the circulation, giddiness, insomnia, nausea, and vomiting, or convulsions should supervene, its use ought to be suspended. It has been the opinion of some practitioners, that its effects are cumulative, and that they may explode —as it were—some time after it has been discontinued. This may be borne in mind. At the same time, it is proper to add, that although the author has prescribed it largely in hospital and in private practice, he has never witnessed this cumulation, which has been the source of so much alarm to others. It would seem, however, from the results of experiments on digitalin by MM. Bouchardat and Sandras, that its toxical power has to be feared, notwithstanding the prescriber may have felt secure for several days.

Digitalis is not often, perhaps, given alone as a diuretic. It is either combined with squill, bitartrate of potassa, or with the mild chloride of mercury—with the latter, for the reasons already expressed (p. 293). The Edinburgh College has a PILULA DIGITALIS ET SCILLÆ, which is a combination of two of the diuretics mentioned: (*Digital.*, *Scillæ*, āā p. i: *Confect. Aromat.* p. ii. Beaten into a proper mass with *confection of red roses*, and the mass divided into four-grain pills.)

The INFUSION and the TINCTURE are officinal in the Pharmacopœia of the United States; and the latter is perhaps more frequently employed.

INFU'SUM DIGITA'LIS, INFU'SION OF FOXGLOVE.—(*Digitalis* ʒi; *Aquæ bullient.* Oss; *Tinct. cinnam.* f℥j.) The tincture of cinnamon is added to prevent the digitalis from affecting the stomach. The infusion is a good preparation; by some, indeed, it is believed to be the most effective of any. Its dose is f℥ss to f℥j, repeated every six hours or oftener. Observations by Dr. Munk on a very large number of cases induce him to give the preference to the infusion as a diuretic over every other preparation of the drug.

TINCTU'RA DIGITA'LIS, TINCTURE OF FOXGLOVE.—(*Digitalis* ℥iv; *Alcohol. dilut.* Oij;—made by maceration, or by displacement.) The usual dose of this tincture is ten drops, repeated three times a day, and cautiously increased where considered advisable. This quantity the author has generally found sufficient to induce not only the diuretic but the sedative effects of the drug. Others, however, fix the usual dose at *ten minims* repeated every six hours; and Dr. Pereira states, that he commonly begins with ♏xx. The largest dose he has employed is fʒj. It has, he states, been given to the extent of *one ounce!* The author has known some cases of protracted and severe disease in which very large doses have been administered with impunity; but these cases of resistance must be considered as exceptions rather than as forming the rule. They may, also, be occasionally explained by inactivity in the preparation. None but well-prepared and well-preserved leaves should be used in the formation of the tincture; and a great superiority has been noticed in that made from carefully preserved leaves imported from England. (Wood and Bache.)

The Germans have a TINCTURA DIGITALIS ÆTHEREA, made by macerating digitalis in sulphuric ether in place of dilute alcohol. Sir George Lefevre says, that this is a very useful preparation, and a convenient mode of administering the remedy. The nauseating properties of the digitalis, he thinks, are counteracted by the stimulant power of the menstruum; and in cases of serous effusion, where it is desirable to increase the action of the absorbents, and to determine to the kidneys, this preparation seems to combine those advantages without producing the nausea and exhaustion, that frequently accompany the use of the simple tincture.

DIGITALIN, described above, when exhibited in a very serious case of anasarca complicated with pericarditis and hæmaturia, caused, according to M. Bouchardat, an enormous and immoderate diuresis, accompanied by greatly diminished frequency of pulse, which, in 48 hours, fell from 120 to 54 in the minute. The absorption of the dropsical fluid was effected very rapidly, and the treatment proved successful. In two cases of pleurisy, the diuretic action was evident, and the absorption of the effusion seemed to be hastened. The dose and mode of administering this energetic agent require the greatest circumspection. MM. Homolle and Quevenne, from comparative essays, have found, that four *milligrammes* (gr. ·0616) of digitalin correspond in energy of action to about eight French grains (gr. 6·56) of digitalis.

26. COL'CHICI RADIX.—COL'CHICUM ROOT, AND COL'CHICI SEMEN.—COL'CHICUM SEED.

The general properties of Colchicum are described under the head of SEDATIVES. In its effects it is said, by some, to resemble digitalis in one thing,—that it renders the pulse less frequent. Others, however, think, that it agrees more with squill in certain respects, and they would, consequently, class it rather amongst *Excitant Diuretics*. The root, and the seed have been given as diuretics in dropsy, both formerly and in more modern times. In such cases it is well to push the remedy until it affects the bowels as well as the kidneys. The dose of the dried root and of the seeds is the same,—from two to eight grains.

ACE'TUM COL'CHICI, VIN'EGAR OF COL'CHICUM.—(*Colchic. rad.* contus. ℥ij; *Acet. destillat.* Oij; *Alcohol.* f℥j; prepared either by maceration or displacement.) Vinegar of colchicum has been a favorite diuretic in dropsy. Its dose is from fʒss to fʒj.

The other preparations of colchicum are given under **Sedatives**.

27. VERA'TRIA.

This active principle, whose properties are described under **Sedatives**, is also possessed of diuretic powers; partly, perhaps, as suggested by Dr. Turnbull, owing to the sedative agency, which it has been found to exert on the heart's action, even when applied externally. The testimony of one observer in its favor is so strong as to savor of undue enthusiasm:—"Unadulterated veratria," says Ebers, "acts often on the urinary secretion with magical powers, and it may seem fabulous, when I state, that friction with a very weak ointment of veratria two or three times in the twenty-four hours on the inner part of the thigh, or the back, epigastric region, or around the navel, has excited such a copious secretion of urine, that the patients, under its long continuance, began to feel weak, and the anasarca, and even the dropsical accumulation in the abdomen, in a short time almost disappeared;—circumstances, which indicate the caution that ought to be observed in apportioning the dose, when we are satisfied of the goodness of the article." The experience of Ebers has been confirmed by that of others; but some, as Messrs. Bardsley and Spath, have found it of no avail as a diuretic, and it is now scarcely employed.

Veratria may be given in **Tincture** (*Veratr.* gr. iv; *Alcohol.* ℥j. Dose, gtt. x to xxv, in water); or rubbed on the skin in **Ointment** (*Veratr.* gr. v—xx; *Adipis* ʒj. A piece, the size of a hazelnut, to be rubbed on the skin for five or ten minutes, night and morning.)

IV. ANTILITH'ICS.

Definition of antilithics, and of lithonthryptics—Calculous diathesis—Lithic and phosphatic diatheses—Different varieties of calculus—Therapeutical application of antilithics to those varieties—Lithonthryptics—Special antilithics.

The class of Antilithics or Lithics comprises agents, that counteract the tendency to the formation of calculous concretions in the urinary organs. Under the same head may be investigated the *modus operandi* of lithonthryptics or agents, which are capable of dissolving such concretions; but as our means for the latter purpose are extremely limited, and rarely available or successful, attention will be mainly directed to the class of antilithics.

1. *Antilithics.*

Antilithics are amongst the most interesting of the classes of therapeutical agents; for what disorder is there, that excites more mental uneasiness and apprehension than any form of calculous deposition? The pain attendant upon the presence of stone in the bladder; the inutility of remedial agents, when once it is formed, excepting so far as concerns the prevention of its increase; and the serious operations demanded for its removal,—are sufficient grounds for the anxiety which is felt by every one, when he has reason to believe that he is laboring under a calculous diathesis.

That such a diathesis may be present, we have the most unquestionable evidence; and when it exists, the greatest difficulty occurs in removing the tendency to deposition. Often, it appears, to be owing to an organization derived from progenitors; when—like every other hereditary tendency—it is almost irremediable, although due attention to diet and regimen may accomplish much.

The diathesis is manifestly connected with a morbid condition of the secerning function of the kidney. We find the organ forming that which it ought not, and the urine depositing that which it ought not; but this *vice* of secretion is clearly connected with a morbid condition in other organs. The whole system of nutrition is implicated; the gastric functions are imperfectly performed; the nutrition of the body is impaired; and in the phosphatic diathesis especially—when largely developed—every symptom is present, which is considered to indicate "*cachexia.*"

The ordinary urinary calculi arise from the deposition of substances, which are contained in the urine in a state of health, but are rendered insoluble, owing to various circumstances. Some calculi—as the oxalates—do not exist in healthy urine, and must, consequently, be formed by chemico-vital influence in the kidney. It becomes, however, an interesting topic of inquiry—whether the mischief in these cases is seated altogether in the kidney, or whether it may not be, in part, owing to the blood being modified in consequence of general faulty nutrition, so that it contains matters that do not exist in it in the normal state.

In reply to this it has been urged, that such matters ought to be detected by the chemical analyst; but the objection is invalid, for the reasons elsewhere stated,—that it is by no means easy to detect even an inorganic substance, of whose presence we may, notwithstanding, be certain, when mixed with compounds of organization: it may be so masked by the latter, that its presence cannot be indicated by the ordinary—or, indeed, by any—reagents. On the other hand, there is strong reason for presuming that the disease is not altogether seated in the kidney, when we reflect on the great similarity between the calculous, and the gouty, diathesis. It is a common remark, founded on just observation, that of the children of gouty parents some may be liable to gout, and others to calculus,—the males, who are exposed to indulgence in the ordinary exciting causes, being more subject to the former;—the females to the latter. Both of these cachectic diseases are accompanied by more or less gastric and intestinal derangement, and by modified nutrition in general; and another striking point of similarity is the presence of urate of soda in the concretions that are met with in the joints of those who have suffered from repeated arthritic attacks. Lithic or uric acid was at one time supposed to exist in the urine only, and it is the constituent of one form of urinary calculi; yet, in gouty cases, it is separated from the blood by other organs than the kidneys; and we are, consequently, compelled to infer, that in calculous cases the disease may not merely consist in faulty secretion by those organs, but that the blood may contain elements, which can be combined in other secreting organs; and they clearly are so, in the case of gouty concretions. In the treatment of calculous cases, therefore, it becomes a matter of moment, that our attention should not be directed exclusively to the kidneys, but that it should be extended to the state of the whole system; and experience exhibits the correctness of this doctrine.

The results of the chemical researches of Liebig led him to infer, that when uric acid is subjected to the action of oxygen under certain conditions, it undergoes a metamorphosis, whence, amongst other matters, oxalic acid results. "Calculi, containing uric acid, or oxalic acid," he says, "are never found in phthisical patients;"—a rule, however, which requires fresh observations before it can be considered absolute;—and he adds:—"it is a common occurrence in France, among patients suffering from calculous complaints, that when they go to the country, where they take more exercise, the compounds of uric acid, which were deposited in the bladder during their residence in town, are succeeded by oxalates (mulberry calculus), in consequence of the increased supply of oxygen. With a still greater supply of oxygen, they would have yielded, in healthy subjects, only the last product of the oxidation of uric acid,—carbonic acid and urea."

The two chief calculous diatheses are—the *lithic* or *uric*, and the *phosphatic*. The *former* is usually attended by a state of the urine, which reddens litmus paper; by yellow, red, lateritious, or pink depositions of lithate of ammonia; or by the appearance of *red gravel*, which consists of crystals of lithic acid, or, of *white sediment* of lithate of soda. In the *latter*, the urine is usually pale; at times alkaline; and there is a deposition of *white gravel*, or crystals of phosphate of magnesia and ammonia; or the white sediment contains the mixed phosphate of magnesia, ammonia, and lime.

At times, these two diatheses do not alternate in the same individual; but there is usually a great disposition for the lithic to change into the phosphatic. The urine becomes pale under slight causes of general, or gastric disorder; mixed lithic and phosphatic deposits occur, or an iridescent pellicle of triple phosphate forms upon its surface. (Dr. Marshall Hall.) At length the urine becomes alkaline, and white gravel is deposited. The phosphatic diathesis is now confirmed.

These are the chief diatheses, but others may be enumerated. For example one exists, in which the crystals of the triple phosphate are apt to be changed for a pulverulent deposit of that phosphate, mixed with phosphate of lime. This mixture constitutes the *fusible calculus*, and into it all the other forms of calculous diathesis have a tendency to pass. Again, there is another, in which the *mulberry calculus* or that which consists of oxalate of lime may be formed. Oxalate of lime is not unfrequently found in the urine of perfectly healthy persons. Its quantity may be increased by the use of vegetable substances containing oxalates; as well as by peculiar changes of uric acid; but its presence is most commonly perhaps owing to abnormous or pathological changes in the decomposition or breaking down of the tissues.

The constituents of urinary calculi for the prevention or removal of which antilithics are administered may be summed up as follows: *Lithic or uric acid*, *Lithate of ammonia*, *Oxalate of lime*, *Cystic oxide*, *Xanthic oxide*, *Carbonate of lime*, *Phosphate of lime*, and *Phosphate of magnesia and ammonia.*

From different data, examined by Dr. Prout, it appears that lithic acid predominates in more than one-third of the whole number of urinary calculi; and very generally it forms the nucleus even of other varieties. It would seem, consequently, that the deposition of lithic acid is a primary step in the formation of urinary calculi, and that the phosphatic and oxalatic formations are the result of a gradual transition from the lithic to the phosphatic or oxalatic diathesis. In the progress of this transition, the lithic acid deposition is, in the first instance, changed into one of lithate of ammonia, with a loss of the tinge derived from the coloring matters of the urine. After some time, this last gives place to a sediment, which is chiefly composed of carbonate and phosphate of lime; and this is ultimately succeeded by a deposition of the phosphates of lime and magnesia, in combination with ammonia. From all his inquiries on the interesting subject of urinary depositions, Dr. Prout conceives himself warranted in deducing the general *law*,—"that in urinary calculi, a decided deposition of the mixed phosphates is never followed by other depositions."

Any unusual formation of acid in the stomach, or elsewhere, may be the cause why lithic acid is deposited from the urine. If we add acid to healthy urine, it is thrown down in small reddish crystals. The lithate of ammonia, which exists in the urine, is decomposed; the acid, which we add, lays hold of the base; and lithic acid is deposited. We can thus understand, that a deposition of lithic acid crystals may be an evidence of acid dyspepsia. In this last affection, again, as well as in other states of the system, there may be an undue formation of lithic acid or of lithate of ammonia,—as in those laboring under the lithic acid diathesis,—and calculus, or gravel may be deposited from such redundancy.

Therapeutical Application of Antilithics.

After what has been said, the remedies belonging to the class of antilithics will be apparent. Whenever, from the appearances presented by urinary deposits, and by the concomitant symptoms of lithiasis, it is manifest, that lithic acid or lithates are separated from the urine in undue quantity, remedies of the alkaline class should be employed to neutralize any predominant acid; and, along with these, tonic and revulsive means for improving the general health. Dr. Prout has shown, that when the lithic acid diathesis exists, and the urine is constantly acid, high colored, and concentrated, repeated doses of alkalies not only render the urine alkaline, but keep it so as long as they are employed. With these views, liquor potassæ, or carbonates of potassa and soda are administered, with some vegetable tonic, and a thorough change of all the physical and moral circumstances surrounding the individual,—if this be practicable,—is recommended. Change of air, society, and scenery, must, indeed, be regarded as amongst the most important agents, not only in the lithic acid—but in every kind of calculous—diathesis. The importance, too, of keeping up a free cutaneous exhalation is obvious. The perspiration is acid, and if this acid be not exhaled, its retention in the system may give rise to the acid predominance of which mention has been made. On these grounds, it has been affirmed by Dr. Wilson Philip, that dyspepsia tends to increase the deposition of lithic acid, and to lessen that of the phosphates, both by producing acidity of the primæ viæ, and by rendering the skin inactive; and that indolence has the same tendency, both by inducing dyspepsia, and by lessening the activity of the skin, in proportion as it impairs the vigor of the constitution.

Dr. A. T. Thomson asserts, that lithic acid, in a healthy condition of the habit, is freely thrown off by the cutaneous exhalants; but he probably has not sufficient ground for the assertion; nor is it necessary to suppose the exhaled acid to be the lithic—to account for the increased deposition of lithic acid from the urine, in the cases we have been considering. Any acid predominance may induce the same effect.

It was affirmed by Mr. A. Ure, that hippuric acid is found in the urine after BENZOIC ACID has been taken; and that the quantity of lithic acid is thereby diminished. Hence, benzoic acid was recommended by him in cases of the predominance of lithic acid. The observations of chemists have not, however, confirmed this. On the contrary, they have shown, that although benzoic acid appears to be converted into hippuric, there is no diminution in the quantity of lithic acid. Neither, therefore, in the lithic acid diathesis, nor in cases of the formation of gout stones or tophaceous deposits,—the chief constituent of which is lithate or urate of soda,—can the administration of benzoic acid be advantageous. Since then, PHOSPHATE OF AMMONIA has been proposed on equally faulty theoretical considerations for the removal of the lithates of soda and lime, which have been considered to constitute the matter of gout. The evidence in support of the good effects of this agent in gout and rheumatism are given in another work (*New Remedies*, 7th edit. p. 93, Philad. 1856), and as subsequent experience has neither established the theoretical nor practical views adduced in its support as a remedy in lithuria, it is not necessary to say more of it here, than that the dose in which the salt is given is from ten to twenty grains, three times a day, dissolved in water.

A suggestion has been made by Dr. Golding Bird,—founded on the remarkable solvent action of PHOSPHATE OF SODA on uric acid, to which Liebig has directed attention,—to administer the phosphate in solution, sufficiently diluted,—a scruple to half a drachm, for example, —in any vehicle, as broth or gruel. In two cases, its administration appeared to Dr. Bird to be followed by manifestly good effects.

The causes that give rise to the deposition of the phosphates are of a different character. In healthy urine they are considered by Berzelius to be held in solution by free phosphoric and lactic acids; and if anything interferes with the presence of these acids in due quantity, the phosphates are deposited. Dr. Prout offers another explanation, which is more simple and intelligible. The phosphates, he says, exist in the urine as supersalts, and in this state are soluble; but, if anything neutralizes the redundant acid, so as to reduce the supersalt to a neutral salt, it is then deposited,—the neutral phosphate being insoluble. If a few drops of ammonia be added to healthy urine, the phosphates are thrown down, and the cause of this deposition is differently explained by Berzelius and by Prout, according to their particular views;—the former considering, that the ammonia neutralizes the free phosphoric and lactic acids; and the latter, that it neutralizes the excess of phosphoric acid.

The general symptoms that accompany the deposition of the phosphates are often very distressing. Both the *physique* and the *moral* are greatly implicated. Derangement of the digestive organs is a universal concomitant, succeeded by every symptom of impaired nutrition. In some cases in which the bladder has lost a portion of its muscular power,—as in diseases of the prostate, affections of the spine, and in the aged,—the urine is retained so long in the bladder, that it undergoes partial decomposition; ammonia is generated, and a deposition of the ammoniaco-magnesian phosphate takes place.

As far as regards the use of chemical remedies, the selection for the phosphatic diathesis is clear. That which is proper for the lithic acid diathesis would be obviously injurious in this: accordingly alkaline remedies have to be avoided, whilst acids,—especially mineral acids,—can be administered with great advantage. They may not only pass into the blood, and act chemically on that fluid, but invigorate the digestive apparatus, and prevent fresh deposition. Dr. Prout states, that fluids containing malic acid seem to possess peculiar powers in arresting the deposition of the phosphates, in some individuals. Hence the beneficial effects, in many instances, of cider and perry.

In cases of *alternating calculi*, the treatment has necessarily to be varied according to the character of the deposition,—acid or alkaline remedies being given according as the deposits are, at the time, phosphatic, or of lithic acid; but in the depositions of oxalate of lime, nothing but general management can offer any prospect of benefit. There is no chemical antilithic available in such cases. All that can be done in this, as well as in the other forms of the calculous diathesis—when inveterate—is to inculcate the necessity of a thorough change of the physical and moral influences surrounding the individual, so as to break in upon the morbid catenation as effectively as possible. With this view, travelling, air and exercise are recommended,—with all their revulsive accompaniments; well-regulated diet and regimen; attention to the condition of the bowels, and everything that can induce tone in the economy generally. By thus modifying the whole system of nutrition, the calculous diathesis may occasionally be got rid of; and no farther signs of lithiasis may occur, even when the individual has been previously strongly disposed to, and even laboring under, calculous depositions. If the views of

Liebig, however, be correct (p. 313), it would seem, that in the case of lithic depositions, country air would be injurious to residents of towns by converting the depositions into those of the oxalates:—but this matter cannot be considered settled. In the case of an intelligent medical gentleman from the interior of Maryland, who consulted the author many years ago, phosphatic depositions, which were copious, were invariably corrected by the free use of saccharine aliment.

From what has been said, we can fully understand the agency of tonics and astringents, when employed as antilithics. But it has been imagined, that certain bitters, which combine an astringent principle, are peculiarly adapted for such cases;—this principle being presumed to enter the circulation, and to act more particularly on the kidneys. At one time, indeed, it was believed—it need hardly be said erroneously—that such vegetables possess chemical or solvent properties. Of these tonics, presumed to operate especially as antilithics, the leaves of diosma crenata or buchu; the root of pareira brava, and the leaves of uva ursi have been chiefly recommended; but the author is not prepared to corroborate the once prevalent, but now generally exploded, idea, that they produce other results besides those of acting as astringent tonics on the stomach, and of improving the gastric functions. (See, on the nature and therapeutics of calculous depositions, the author's *Practice of Medicine*, 3d edit. i, 704, Philad. 1848.)

2. *Lithonthryptics.*

Thus far of antilithics.—Not much can be said of *lithonthryptics* or solvents of calculi. The fact that certain mineral waters, as the Vichy, render the urine alkaline, could scarcely fail to suggest their use in calculous affections. It would not seem, that the destruction of calculi by that water is effected merely, or perhaps chiefly, in the way of solution; but that it is accomplished in a very considerable degree, especially as regards those of the triple phosphates, by a kind of disintegration of their component particles. When calculi consist of the oxalate or phosphate of lime, mingled with lithic acid, lithate of ammonia, or the triple phosphate, Vichy water is said to attack and disintegrate them rapidly. These waters contain a large amount of free carbonic acid, and nearly a drachm and a half of bicarbonate of soda in every thousand drachms of the menstruum. Besides greatly increasing the quantity of the urine, they exert a decided influence on its chemical constitution; rendering it rapidly neutral if previously acid, and afterwards alkaline: from being high-colored it becomes pale, and, having deposited copiously, becomes limpid and transparent. The experiments of several observers are certainly encouraging; and suggest the importance of employing the fictitious waters of Vichy where the natural water is not attainable. A formula for these is given hereafter.

Under views analogous to those which have suggested the use of the alkaline mineral waters, the different alkalies and alkaline earths have been freely administered as lithonthryptics. It is not probable, however, that either the mineral waters in question, or the alkalies, can generally be productive of benefit, except where the depositions are of lithic acid or the lithates. Still the fact must be borne in mind, that under the protracted administration of such waters, and likewise of alkalies, combined with the free use of diluents, calculi of other kinds have experienced disintegration. Where, too, these agents have failed to dissolve or break down the calculus, they would seem to have greatly mitigated the concomitant sufferings.

Solvents might be brought into immediate contact with vesical calculi by injection; and, in this way, alkalies and acids, properly diluted, have been employed. Experiment seems to have shown, that the bladder cannot bear the presence of an alkaline solution sufficiently strong to dissolve a lithic acid calculus; but it would appear from the experiments of Sir Benjamin Brodie, that loose concretions of the phosphates and of carbonate of lime may be acted upon by a weak solution of nitric acid, and thus be gradually removed from the bladder. The strength of the solution employed by Sir Benjamin was two minims and a half of the acid to a fluidounce of distilled water. The injection was sent through a canula of pure gold. It occasioned no pain: the patients experienced relief from all their symptoms; the quantity of adhesive mucus from the lining membrane of the bladder was diminished; and the constant desire to empty the organ much abated. By testing the fluid that had been used with a concentrated solution of ammonia, phosphates were abundantly precipitated—proving that the calculi had been acted upon.

In the year 1812, Dr. Joel B. Sutherland, of Philadelphia, in his inaugural dissertation presented to the Professors of the University of Pennsylvania, proposed to employ galvanism for the decomposition of calculi in the bladder, by passing wires, connected with the poles of a galvanic apparatus, into that viscus: and at a subsequent period, MM. Prévost and Dumas showed by experiments on animals its feasibility; but the proposition has received little attention. It is to be feared that any electrolytic power, which could be introduced within the bladder in this way, would be apt to act upon the organ itself, and, consequently, not be devoid of danger. Cystitis is an affection to be apprehended from all such agents. Dr. Bence Jones, however—who has made some successful experiments on the solution of urinary calculi in dilute saline solutions, at the temperature of the body, by the aid of electricity, out of the body—thinks, that whilst, at present, by the aid of the lithotrite, mechanical force is applied to the surface of the calculus, and the stone is passed in fragments, at some future time, by the aid of an appropriate instrument or litholyte, chemical force may be set up at the surface of the calculus, so that it will be passed in solution, or as an impalpable precipitate.

The most important lithonthryptics belong to the domain of surgery, and do not, therefore, fall under consideration in this work. It seems clear, from the experience of practitioners on both sides of the Atlantic, that there are cases which admit of urinary calculi being broken down in the bladder, by the introduction of contunding instruments into that organ, without the bladder necessarily suffering; and the operation of lithotrity or lithothrypsy or lithotresis must be included amongst those improvements, for which the philanthropist has to thank the genius and daring of the modern surgeon.

SPECIAL ANTILITHICS.

1. *Acid Antilithics.*

The circumstances under which acids are advisable in calculous depositions have been pointed out already (p. 316). It was then shown that they are eminently serviceable in the white or *phosphatic;* whilst they cannot fail to augment the *lithic.*

Of the Mineral Acids, either the *sulphuric*, the *muriatic*, or the *nitric* may be prescribed; but preference is usually given to the first two—under the notion, derived, perhaps, from too limited experience, that the last disagrees with some stomachs. It has been given, however, in large doses without any such inconvenience. Muriatic acid would seem to be the most congenial, inasmuch as it is one of the acids always secreted in the healthy state of the stomach, and, therefore, taken at times with impunity even by those who suffer from acidity. In neutral or alkaline indigestion, as it is termed, which is occasionally mistaken for acid indigestion, this acid is a great remedy.

Muriatic acid may be given in the dose of from ♏x to ♏xl in any demulcent drink; and during its administration—indeed, whenever acids of any kind are given—the urine must be carefully inspected; and if any signs of the lithic depositions appear, the acid must be discontinued.

Both in the case of children and adults, the careful use of mineral acids is to be preferred, if for no other reason, on account of the uncertainty that exists in regard to the *modus operandi* of the Vegetable Acids. It is a common belief, that the latter are decomposed; and, accordingly, a difficulty may exist in knowing whether they may be beneficial or the contrary. Observation ought to settle this question; but it has not yet done so. Hence, the ordinary mineral or carbonated water of the shops may be a questionable remedy in lithic depositions, so far as regards its chemical agency; yet it may be of essential service through the gentle stimulation which it gives to the digestive function. *Lactic Acid* has been suggested by M. Magendie, owing to the facility with which it dissolves phosphate of lime. From one to four fluidrachms of it may be dissolved in a quart of water, sweetened with two fluid ounces of syrup, and taken as lemonade.

2. *Alkaline Antilithics.*

Alkalies, as already remarked, are indicated in cases of lithic deposition; in which they seem to prove beneficial, not only by their action in the stomach as antacids; but likewise by passing into the mass of blood, and being separated by the kidneys. That they do act in the latter manner is shown by the fact, that after they have been administered for some time, the urine, from being acid, is rendered alkaline. This fact has been attested by numerous observers; yet it has been denied by Schmidt; and the observations of Dr. E. A. Parkes, Professor of Clinical Medicine in University College, on the action of liquor potassæ on the urine in health, do not confirm it. He found usually in from thirty to ninety minutes after its entrance into the circulation, that an increased flow of slightly acid urine occurred, which contained the whole of the potassa. Yet, says Dr. Pereira, "that the urine becomes alkaline from the employment of the alkalies and their carbonates, is a fact to which I and most practical physicians can bear testimony."

In a state of health, the constant use of alkalies may occasion the deposition of white or phosphatic sediments. Mr. Brande has affirmed, that he has known "soda water exhibited in a case of stone in the bladder, produce abundance of white sand; which the ignorance of the patient and his medical attendant led them to refer to the solvent power of the medicine upon the stone, which they thought was gradually giving way and being voided; whereas great mischief was doing, by giving the urine more than its usual tendency to deposit the phosphates, and, consequently, to augment the size of the calculus." It would be singular, however, were the effect, in this case, to be referable to the action of the soda water, which, as generally sold in the shops, contains no alkali whatever, and is in reality acid by its impregnation with carbonic acid.

Liquor Potassæ, *Solution of potassa*, was at one time more employed as an antilithic and lithonthryptic than any of the alkalies. An objection urged to the pure alkalies is, that they are apt to induce irritation in the lining membrane of the stomach; and such may be the case if they are given in very large doses. It must be recollected, however, that more or less acid is generally present in that organ, by means of which a portion, and, in particular cases, the whole of the alkali administered may be neutralized. Cases, too, are recorded, in which the potassa has been administered for a long period, and in considerable quantity, without the supervention of any disagreeable results. A patient of Dr. Marcet took it regularly for ten years, and during that time passed many calculi, all of which had their angles rounded, and their edges blunted, "in a manner which could hardly be explained, except from the long-continued effect of the alkaline medicine." Still, the bicarbonates of the alkalies are devoid of the causticity of the pure alkalies, whilst they have the same antilithic properties. They ought, consequently, to be preferred.

The dose of Liquor Potassæ is ♏x to ♏xxx, given two or three times a day in water. Veal broth and table beer have been recommended as vehicles, but although the latter disguises the urinous and unpleasant odor of the alkali, the acid of the beer may neutralize a portion of it; and the beer itself is but little calculated for the phosphatic diathesis. An empirical remedy for stone, known under the name of '*Dr. Chittick's nostrum,*' is said to be a solution of alkali in veal broth.

Carbonates of Potassa and Soda are milder preparations of the alkalies, and yet at least equally effective antilithics with the pure alkali. Bicarbonate of soda is the least disagreeable, and is probably as efficacious as any; yet the use of potassa has appeared to prove beneficial in calculous affections, where soda failed to afford any relief; and it is important to bear in mind a fact mentioned by Dr. Prout, that the urate of potassa is a soluble salt, and the urate of soda less so. As it is possible, however, that the main efficacy of antilithics may be exerted upon the first passages, and on the blood, rather than on the kidneys, the circumstance mentioned by Dr. Prout may not be a valid objection to the use of soda. Sir Gilbert Blane accounted for the greater advantage of soda in calculous complaints by the assumption, that soda becomes applied to the purposes of the economy before it arrives at the kidneys; whereas potassa passes to those organs to be thrown out of the system. The dose of the carbonates of potassa and soda, as antilithics, is from gr. x to ʒss; that of the bicarbonates of the same alkalies, from gr. xx to ʒj. They may be given in water, or in the common soda water of the shops.

Ammonia and Carbonate of Ammonia are at times administered with the same view. Their effects would seem to be wholly exerted upon the primæ viæ; and the same is probably the case with Magnesia, Carbonate of Magnesia, and Lime-water. The first and second of these are used largely as antilithics. Magnesia was first strongly recommended by Mr. Brande, who properly remarks, that under its use in the lithic diathesis the red deposit in the urine becomes much diminished, or disappears altogether; and the irritation of the kidneys is proportionately relieved. It must be borne in mind, however, that magnesia sometimes accumulates in the bowels when it is given for a long period. Either magnesia or its carbonate may be prescribed in the dose of from gr. x to gr. xxx in water or milk. The *fluid magnesia*, elsewhere prescribed (p. 175), is a good preparation in these cases. It is a solution of magnesia in carbonated water.

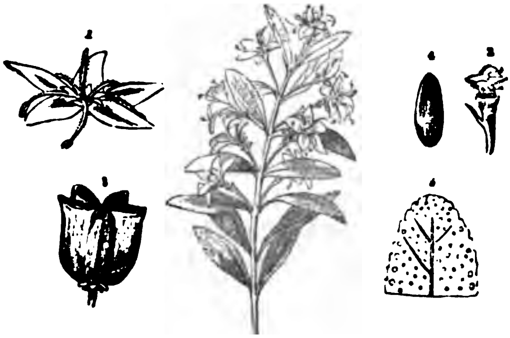
It is by virtue of the alkali they contain, that the Vichy waters,—already referred to—are so celebrated in France in calculous cases. These are in such high repute, that they are directed to be prepared artificially, and are sent to every part of Europe; but it need scarcely be said, that no artificial or real water drunk away from the spring, and therefore without the accompanying advantages of travelling air and exercise, can be regarded as substitutes for the water taken at the source. The following form for the *artificial Vichy water* is given in the *Codex Medicamentarius* of Paris: Take of *simple acidulous water*, impregnated with twice its bulk of *Carbonic acid*, ℥xxss; *Carbonate of soda* gr. xxxij; *Sulphate of soda* gr. xvj; *Chloride of sodium* gr. iv; *Carbonate of Magnesia* gr. ss; *Chloride of iron* gr. $\frac{1}{4}$.—M.

In this country, the Saratoga waters constitute an excellent remedy, and not the less so from the slight impregnation of iron, which they contain.

3. *Tonic Antilithics.*

1. BUCHU.

Fig. 71.



Barosma crenata.

1. Calyx. 2. Styles and stigma. 3. Fruit. 4. Seeds. 5. Dots on leaf.

The Pharmacopœia of the United States, along with those of London and Dublin, refers Buchu leaves to various species of *Barosma.* "This drug"—says Dr. Christison—"furnishes a good illustration of the inconvenience of attempting a correct botanic nomenclature of the articles of the Materia Medica. It has been known in Britain for about twenty years under its original Hottentot name of Buckhu or Buchu; but the London College had scarcely admitted it into the Pharmacopœia under the botanical name of Diosma, before botanists discovered that the plant or plants from which it is obtained must be removed into a new genus, now termed *Barosma.*"

Barosma crenata, SEX. SYST. Pentandria Monogynia; NAT. ORD. Rutaceæ, is a native of Southern Africa near the Cape of Good Hope. Several species of Barosma are used by the Hottentots on account of their odorous and medicinal virtues. A powder, with which they anoint their bodies, is composed of various odorous matters, and chiefly of Barosmas. They are small shrubs, which have a heavy and peculiar smell; hence the name *Barosma*—from βαρυς, 'heavy,' 'powerful,' and οςμη, 'odor;' by some, the odor has been considered 'divine,'—hence the name *Diosma,* from διος, 'divine,' and οςμη, 'odor.'

Buchu leaves—as met with in the shops—are those of several species of barosma, intermixed with stalks and fruit. They are smooth, somewhat shining, sharply or bluntly serrated or crenated, and are studded with little oil-vesicles, containing the essential oil, which gives them a portion of their odor. The taste of the leaves is aromatic, somewhat pungent, bearing a resemblance, according to Buchner, to peppermint. Some compare it to rue; others to rosemary; others to cumin; and others, again, to the urine of the cat. (Pereira.) The main constituents, afforded by analysis, are a volatile oil of a yellowish-brown color, and lighter than water, which has the odor of the leaves,—and a bitter extractive matter, *Diosmin.* The leaves afford their virtues to both water and alcohol.

Their medical properties, like those of the other articles under this head, have been greatly exaggerated. By virtue of the volatile oil, they are excitant, and perhaps slightly diuretic; and, by their bitter extractive, tonic. They are, consequently, adapted for giving tone to the digestive organs, and through them to the general system; but the evidence is utterly inadequate to show, that they have, otherwise, any effect in calculous diseases; or that they possess any special action on the urinary organs. Dr. Wood, of Philadelphia, has correctly remarked, that "they are chiefly given in complaints of the urinary organs, such as gravel, chronic catarrh of the bladder, morbid irritation of the bladder and urethra, disease of the prostate, and retention or incontinence of urine from a loss of tone in the parts concerned in its evacuation;"—and he might have added, that we are not in possession of any remedy which could act beneficially in diseases of such opposite characters. The suggestion, that in lithiasis, attended with increased secretion of uric acid, buchu should be given in combination with alkalies, is good, inasmuch as in this manner we neutralize any predominance of acid; whilst, at the same time, we give tone to the system; and thus remove the tendency to its fresh generation.

The dose of the powder is from gr. xx to ʒss.

INFU'SUM BUCHU, INFU'SION OF BUCHU.—(*Buchu* ℥j; *Aq. bullient.* Oj.) Dose, f℥j to f℥ij.

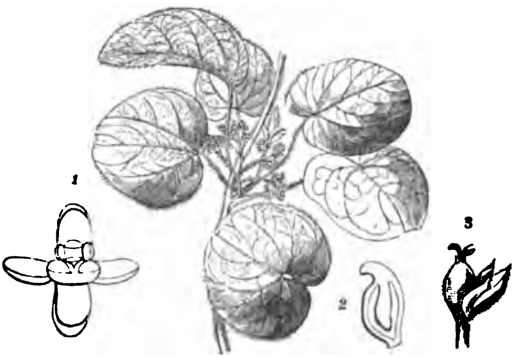
The Dublin Pharmacopœia has a TINCTURE OF BUCHU (*Buchu* ℥v; *Alcohol. dilut.* Oij;—made either by maceration or percolation), the dose of which is from fʒj to f℥ss.

2. PAREI'RA.—PAREI'RA BRAVA.

Pareira of the Pharmacopœias is the root of *Cissampelos Pareira*, *Pareira Brava*, *Velvet Leaf;* SEX. SYST. Diœcia Monadelphia; NAT. ORD. Menispermaceæ, a climbing plant, which is a native of South America and the West India Islands. The root—as met with in the shops—is in roundish pieces, from half an inch to four inches in diameter; from four inches to some feet in length, and often split longitudinally. The epidermis is thin, of a brown color, furrowed longitudinally, and wrinkled transversely. The interior of the root is of a yellowish color, very porous, and marked by irregular concentric circles. It is devoid of smell; and has a sweetish, and afterwards a nauseous bitter taste. The active principle of the root is considered to reside in a yellow bitter matter, which is soluble in both alcohol and water. A new vegetable alkaloid principle has been separated by Wiggers, to which he gave the name *Cissampelina;* whose properties have not been described.

Pareira yields its medical virtues to water; hence, an extract and an infusion are officinal in the London and Edinburgh Pharmacopœias. The Pharmacopœia of the United States has no officinal preparation of it. The same properties have been assigned to it as to diosma; with the addition that it was at one time highly extolled as a lithonthryptic; and it was even affirmed that calculi—of the size of an olive—had disappeared under its administration. The author has carefully watched its effects; but neither in its general action on the system, in its effects on calculous depositions, nor in chronic diseases of the urinary organs, has he seen any other properties than those exhibited by the ordinary bitter tonics; and, where different results have supervened in the practice of others, it is probable that they were owing to the system of medication combined with it. He has not had the shadow of a reason for believing it—as cited by Dr. Christison—“ to possess specific virtues over various disorders of the urinary organs, more especially chronic inflammation of the bladder.” “ A careful inquiry into its physiological action,” says the writer just cited, “ is much wanted: for some have failed to observe the diuretic and aperient properties ascribed to it by others; and they are disposed to think, as would be anticipated alike from its sensible qualities, and its place in the natural arrangement of vegetables, that it is nothing else than an excellent tonic bitter akin to calumba. The authority of Sir B. Brodie, who has recommended it in chronic urinary diseases, and especially in chronic inflammation of the urinary bladder, has of late brought it into general employment. The information communicated to me on this point, by various surgeons here who have made trial of it, is not in its favor.”

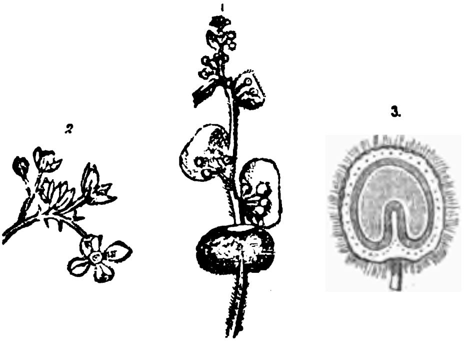
Fig. 72.



Cissampelos Pareira.

1. Separate flowers. 2. Embryo. 3. Calyx.

Fig. 73.



Cissampelos Pareira.

1. Raceme of flowers. 2. Separate raceme. 3. Section of ovary.

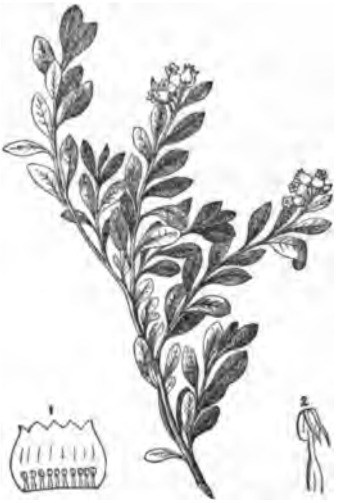
Sir Benjamin recommends a decoction prepared by simmering four ounces of the root in three pints of water, until the fluid is reduced to two pints. From six to twelve fluidounces of this decoction may be taken in the twenty-four hours; but it is important to add, in judging correctly of its virtues, that Sir Benjamin is in the habit of adding to it tincture of hyoscyamus; and where there is any deposition of triple phosphates, indicated by milky urine, with an iridescent pellicle on the surface, he adds muriatic or nitric acid,—agents which are themselves valuable antilithics.

INFUSUM PAREIRÆ of the London and Edinburgh Pharmacopœias, is made by macerating six drachms of *Pareira* in a pint of *boiling water*. The dose of this is from f℥j to f℥iij. EXTRACTUM PAREIRÆ of the London Pharmacopœia is prepared in the same manner as extract of gentian. Its dose is gr. x to ʒss; and it is often given along with the Infusion.

8. UVA URSI.

Uva Ursi, in the London and United States Pharmacopœias, is the officinal name of the leaves of *Arbutus Uva Ursi*, *Arctostaphylos Uva Ursi*, *Bearberry*, *Bear's Whortleberry;* SEX. SYST. Decandria Monogynia; NAT. ORD. Ericaceæ; a low evergreen shrub, which is a native of the northern latitudes of Europe, Asia, and America. On the American continent, it extends from Hudson's Bay as far southward as New Jersey, whence it is obtained for the market of Philadelphia. (Wood and Bache.) The leaves are gathered in autumn, and the green ones are selected.—They are apt to be mixed with *Vaccinium Vitis Idæa*, *Red Whortleberry*, a plant of the same natural family, the leaves of which are minutely toothed, and the under surface dotted; whereas, the edges of the genuine leaves are entire, and the under surface reticulated. Moreover, the spurious leaves are deficient in astringency, a remark which applies to the box-leaf, which is sometimes mixed with it,—the true uva ursi leaf having a bitterish and strongly astringent taste; but no odor except when in powder. It then resembles that of hay. Its virtues, which are mainly dependent upon tannic acid, are yielded to water and to alcohol. Tannic acid—as elsewhere observed—is the great astringent principle of vegetables.

Fig. 74.



Arbutus Uva ursi.

1. Anthers. 2. Single anther, showing spurs.

Uva Ursi is possessed of the powers of the ordinary astringents; but, so far as the author has observed, of nothing more; yet it has all the virtues ascribed to it that have been assigned to Diosma and Pareira. It has, indeed, been regarded "as a specific in diseases of the kidneys and bladder at large." "In recent times," says Dr. Christison, "it has been succeeded, as a panacea, in urinary diseases, by the Pareira brava root,—probably"—he gravely adds, "without sufficient reason." Nothing can be more feeble than the testimony which has been brought forward in favor of its specific affinity for the urinary organs, and, accordingly, the confidence of surgeons in regard to it is becoming less and less; at all events, their sentiments are highly discordant. As an antilithic it appears to act solely by its tonico-astringent properties.

The dose of powdered uva ursi is from ℈j to ʒj, given three or four times a day; but the form usually preferred is

DECOC'TUM UVÆ URSI, DECOC'TION OF UVA URSI.—(*Uvæ ursi* ℥j; *Aquæ* f℥xx. Boil to a pint.) The dose is from f℥j to f℥ij three or four times a day.

V. DIAPHORET'ICS.

SYNON. *Diapnoica.*

Definition of diaphoretics—Largely invoked in Therapeutics—Disease not often induced by suppressed perspiration—Modus operandi of diaphoretics—Are indirect agents—How their operation may be aided—Their therapeutical application—Special diaphoretics.

Diaphoretics are defined to be—"agents that augment the function of transpiration."

As it was at one time imagined, that almost every disease, to which mankind are liable, is produced by obstructed perspiration, the class of diaphoretics was extensively employed in medical practice, and numerous agents were admitted into the catalogues of the materia medica, which were supposed to be capable of augmenting the cutaneous exhalation. Even yet, this cause of disease is repeatedly referred to, not only by the unprofessional, but by many of the profession. "Health," says a modern writer—Dr. Eberle—"is very intimately connected with the regular performance of the perspiratory function. Whenever the transpiration by the skin is suddenly checked, more or less derangement of the system is invariably the consequence. That portion of the circulating fluid which nature designs to be cast off by the cutaneous emunctories, as no longer fit for the purposes of the animal economy, is retained and becomes a source of morbific irritation to the heart and other organs." "Disease," says another writer—Dr. A. T. Thomson—"is frequently the consequence of a sudden check to the perspiratory function; means, therefore, have been sought for to restore it; and the substances, classed as diaphoretics, are supposed to have that power."

It may admit of well-founded doubt, whether disease be ever induced by suppression of the cutaneous exhalation. The two great fluids of depuration are the transpiration—cutaneous and pulmonary—and the urine. In summer the former predominates; in winter the latter. Hence, there appears to be a sort of compensation effected between the two depurations, so that if one be diminished by a change of atmospheric temperature, the other is augmented. For this reason, we should not anticipate extensive morbid results from a general check given to perspiration, were we even ignorant of the impunity with which we may pass from a heated apartment into the external air, as well as that which follows the use of the cold bath, after the individual has been exposed to a very elevated temperature,—as in the Russian vapor-bath. Observation has sufficiently shown, that danger is less to be apprehended from such general checks than from the partial and irregular application of cold and moisture. The danger of having the feet cold and wet, or of sitting with a part of the body exposed to a draught of cold air, is proverbial; yet, if we attempt to explain this by the check given to perspiration, we fail; for the loss of the ordinary depuration, in so small a portion of the body, is obviously insufficient to account for the phenomena; yet, disease is far more apt to be induced in such case, than when the whole body is exposed to a sudden alternation of temperature from hot to cold; and when the check to the cutaneous depuration ought necessarily to be to a much greater extent. The author has elsewhere remarked (*Human Health*, p. 45, Philad. 1844), that there is perhaps in every one, at any particular time, some organ or tissue of the body more disposed to take on morbid action than another; and that, between every part of the system of nutrition and secretion such an extensive sympathy reigns, that if one part be irregularly and morbidly impressed, such impression vibrates to every part of the system, so that the tissue or organ most disposed to take on morbid action at the time assumes it. Hence, if a dozen individuals be exposed to the irregular application of cold and moisture to the feet, they may not all have the same disease induced, because in all there was not, at the time, the same disposition in a particular organ or tissue to the assumption of disease.

This irregular nutritive action of a part is the first link in the chain of phenomena,—not the obstruction of perspiration. On this head, a modern writer, Dr. W. F. Edwards, of Paris, has expressed himself in a sound and rational manner. The insensible perspiration he regards as a purely physical phenomenon of "evaporation," whilst the sensible "is a loss ordinarily produced by a vital action in the form of a liquid which transudes." In prosecuting the consideration of this subject, he remarks—"All that we have hitherto shown on the subject of perspiration will considerably facilitate our examination of a question which naturally presents itself. Is perspiration susceptible of being suppressed? It is easier to resolve this question with regard to man and other warm-blooded animals than with respect to the cold-blooded vertebrata. Let us see what is the result of a very low temperature upon warm-blooded animals. We know by the effect of cold upon the sweat, that it diminishes transudation. Now let us suppose, that it may, by its intensity, suppress it altogether, there will remain perspiration by evaporation, which will always take place, however humid the air may be. The high temperature of man, and other warm-blooded animals, warms the air in contact with the body, and changes its hygrometric state by removing it from its extreme humidity; and consequently occasions evaporation. If, on the other hand, the temperature of the air be raised to an equality with that of the body, at the time that it is saturated with humidity in order to suppress evaporation, then perspiration by transudation is excited, and takes place to such an extent in man and other warm-blooded animals, that the sweat will stream from all parts of the body. We can, then, in no case, suppress the perspiration; it will be performed either by evaporation or by transudation. We ought, therefore, to be careful how we take literally what we find in medical books respecting suppressed perspiration. There can be no such thing. That there can be suppression of sweat is evident to every one; but it does not follow that, even in these cases, there is no transudation.

"Since it is difficult to assure ourselves directly, whether transudation is ever entirely suppressed in man, and other warm-blooded animals, let us see what the cold-blooded vertebrata will offer on this point. The batrachians are the best adapted to this kind of research, on account of the nakedness of their skin, of the fineness of its texture, of the copious loss which may be incurred through its medium, and consequently, of the relation which their perspiration bears to that of man. On exposing frogs to the temperature of 0° Cent. (32° Fahr.) in humid air, in order to suppress perspiration by evaporation, they have lost by transudation, in different experiments, the thirtieth part of their weight. Transudation is more abundant in these animals than in man, though the latter be placed in circumstances much more favorable. When we consider how sensible these creatures are to cold, how much the activity of all their functions is diminished at a low temperature, and how much they may even then lose by transudation, it is not to be supposed, that cold suppresses this mode of perspiration in man, and the less so from his having a temperature of his own, which varies very little with the changes of the atmosphere, a condition which has a powerful tendency to maintain transudation. It may be very much diminished by the action of cold, but it appears that it cannot be altogether suppressed. It is a remarkable but well-known fact, that when life is sinking, and to appearance nearly extinct, the body is covered with sweat—so strong is the tendency to continue this function."

In any mode, consequently, of viewing the subject, it does not appear that we can ascribe any extensive series of morbid phenomena to simple suppression of perspiration. Such being the fact, the indication of restoring suppressed perspiration—if it be admitted at all—must exist much less frequently than has been imagined. Yet there are few classes of remedies that are more used, especially by the older practitioners, than diaphoretics; and probably none which are more uncertain in their operation, and on which less reliance ought to be placed. Most of them, too, are agents, which stimulate the heart and arteries, and hence the indiscriminate employment of heating diaphoretics has been productive of much mischief in febrile and inflammatory disorders. In a state of health, anything which gives occasion to the greater propulsion of blood into the cutaneous capillaries, will produce diaphoresis. In this way, exercise and external heat exert a diaphoretic agency; but when the capillary action is in a state of exaltation from disease, the same agencies are not followed by a like result. This state of exaltation has to be reduced before diaphoresis can be effected. The same thing is also exhibited in another way. During the heats of summer, the cutaneous capillaries are kept in a state of perpetual erethism, and although the sensible perspiration may be exhaled to a great extent, it would probably be more largely elicited were the erethism less: accordingly, when we take iced water or any iced drink under such circumstances, the refrigerant influence is exerted on the capillaries of the stomach, and, owing to the extensive sympathy that exists between every part of the capillary surface, the cooling influence is at once communicated to the whole capillary system; the erethism is thus reduced, and copious perspiration ensues. Every one must have observed how rapidly the sensible perspiration is thrown out in hot weather after the use of iced drinks. The effect is, in this case, diaphoresis; but the remedy operates as a *refrigerant*—a class of agents far more efficacious than diaphoretics. It may be doubted, indeed, whether we have any internal remedies, which are capable of acting as direct diaphoretics;—that is, by virtue of specific properties, which they possess over the sudoriparous glandular apparatus of the skin. Dr. Paris thinks, that mercurials and sulphur act in this way, but the only evidence we have of this is, that they pass off by the skin; and as they emerge from the system in this manner, it would be fair, perhaps, to presume, that they may act on the cutaneous capillaries; but we have no evidence in favor of their producing augmented diaphoresis.

The author to whom allusion has just been made, has given the following table of what he considers the *modus operandi* of diaphoretics.

"DIAPHORETICS

Occasion their effects—

I. By stimulating the cutaneous capillaries.
  A. By external application.
    The stimulus of heat, frictions, &c.
  B. By medicines which enter the circulation and stimulate the cutaneous vessels by *contact.*
    Mercurials—sulphur.
  C. By medicines which act on the surface *sympathetically,* through the medium of the stomach.
    Cold drinks, &c.

II. By increasing the general action of the vascular system.
    Violent exercise—Ammonia—Guaiacum—Alcohol—Warm bath.

III. By relaxing the morbidly constricted mouths of the perspiratory vessels.
    Antimonials—Cold affusion—Venesection—Saline diaphoretics."

It has been seen, that the *modus operandi* of cold drinks cannot be referred to any "stimulation" of the cutaneous capillaries; and the same may be said of the warm bath, which certainly does not operate by increasing the general action of the vascular system. Such may be, and is, the effect of the *hot* bath, hot aqueous vapor, or hot air; but the warm bath acts precisely like the cold, by diminishing the action of vessels. A mistake is often made, and a hot stimulating bath is occasionally administered in violent inflammatory attacks, instead of the warm and soothing,—to the manifest detriment of the sufferer. The application of warmth in the form of the warm water bath is one of the most valuable therapeutical means which we possess, especially in the inflammatory and spasmodic disorders incident to childhood. At one time, the salutary agency was universally ascribed to the restoration of suppressed perspiration. It is now known to modify the condition of the capillary system, reducing it when over-excited, and producing a beneficial action of equalization in the circulatory movements, so as to diminish the exaltation of vital manifestations in the organ laboring under inflammation or spasm.

In reality, there are no substances, administered as diaphoretics, on whose direct agency much dependence can be placed, unless they are such as are made to come in contact with the cutaneous surface. Diaphoresis follows the employment of many internal means, but the result is produced indirectly. Antimonials, for example, have been much relied upon for "relaxing the morbidly constricted mouths of the perspiratory vessels;" but this result is not produced by any specific action on those vessels, so much as by exciting a new impression on the system, which breaks in upon the cutaneous erethism. Perhaps, we have no class of remedies more uncertain in their operation than antimonial diaphoretics, as ordinarily administered. It might, indeed, be said, that there are no agents so devoid of any beneficial action; yet, if they are given so as to excite nausea, or a state approaching this, diaphoresis often results; but then it is produced immediately by the state of diminished vital activity, occasioned by the remedy acting as a *nauseant*—a class of agents possessed —as has been seen—of the most valuable properties for reducing morbid exaltation of the vital forces.

The faith, however, that has been placed in antimonials, as usually prescribed, for exerting a febrifuge action, has not been without its advantages. Whilst trust is reposed in them, the feverish invalid is left in quietness, and the irritating system of cathartic after cathartic is, for the time, dispensed with; but that the antimonial is, in many cases, inert, has been sufficiently shown from numerous experiments with *Pulvis Antimonialis* of the pharmacopœias—a powder introduced as a factitious "*James's Powder*"—which have clearly demonstrated, that the preparation is often almost wholly inoperative, even when given in very large doses. It is rarely employed on the continent of Europe; but confidence is still, although unworthily, reposed in it by many practitioners of this country, and of Great Britain. "The utmost diversity of opinion," says Dr. A. T. Thomson, "exists respecting the utility of this preparation; many practitioners contending that it is perfectly inert, others asserting, 'that it is one of the best antimonials we possess.' From the result of its administration in my own practice, I cannot place any confidence in its diaphoretic powers. If there be much muriatic acid present in the stomach, it may prove active; but in general it displays no influence whatever on the system. It has been given in doses of sixty, eighty, and one hundred and thirty grains without any sensible effect. Its occasional activity may be ascribed to the oxide being accidentally in the state of a protoxide."

A cause of its uncertainty has been discussed elsewhere (p. 132). It may be sufficient to remark here, that the results of the author's observations, as regards the general inefficiency of the preparation, have led him to conclusions identical with those of Dr. Thomson; yet he can well recollect how strongly it was urged upon him, by an old and venerated preceptor, to place full reliance upon six or eight grain doses of this preparation, in cases where a febrifuge was needed; and to be especially careful not to exceed this quantity, lest emesis should follow.

In every case, in which the skin is hot and dry, and the indication appears to be, to establish diaphoresis, the precise pathological condition must be inquired into; and, if possible, removed. Hence it is, that the well-instructed practitioner employs 'indirect' diaphoretics rather than such as are esteemed 'direct.' Thus, diminished sensible exhalation takes place from the skin during the existence of fever and inflammation; but the physician does not have recourse to any 'reputed diaphoretic,' which acts by exciting the sanguiferous system. He adapts his antiphlogistic remedies so as to reduce the already too much excited organic actions to the healthy standard, and he finds, when he has removed the internal inflammation, the heat and dryness of the skin subside, and diaphoresis satisfactorily established. Under similar circumstances, a full dose of opium is attended with a similar result. Opium, in a large dose, exerts sedative properties. When, therefore, inflammation is present, sedation is produced by the drug; nervous and sanguiferous excitement are allayed, and the skin becomes cool and moist. Hence it is, that morphia in large doses is often so powerfully diaphoretic.

One of the most celebrated diaphoretics, or *sudorifics*—for the latter term is more frequently employed where the medicine is considered capable of inducing sweating—is a combination of opium with ipecacuanha. Opium, in a small dose, is stimulant; in a large dose, sedative. Ipecacuanha, in a full dose, is emetic; in a small one, nauseant, and, by virtue of the latter property, diaphoretic. Ten grains of *pulvis ipecacuanhæ et opii, Dover's powder*, contain one of opium; and, under the combined action of the substances in this dose, augmented exhalation from the skin takes place as surely as after the administration of any internal diaphoretic agent. It has been the fashion to explain its action by supposing, that whilst the opium increases the force of the circulation, the ipecacuanha relaxes the exhalant vessels, and causes a copious diaphoresis. This, however, is an improbable hypothesis, and the true explanation, perhaps, is—that the combined influence of the two agents is exerted on the vascular and nervous system so as to reduce inordinate activity; in this way, the erethism of the cutaneous system, consequent on irritation existing elsewhere, is removed, and the secretion becomes manifest. It cannot be positively denied, that there may be remedies, which may hurry the circulation, and others that may relax the cutaneous exhalants; but proof is needed, and if their existence were admitted, it would, not be easy to conceive that they could be readily brought to act simultaneously, and it is easier to account for the induction of diaphoresis by such compound remedies as the *pulvis ipecacuanhæ et opii* upon general principles than by invoking specific influences of the reality of which we must remain in strong doubt.

It has been already remarked, that nauseants act as the most effective diaphoretics. Their operation is, of course, indirect; their main agency being exerted on the nervous and sanguiferous systems, which they depress.

The action of diaphoretics is aided by the free use of diluents; but much of their operation is to be referred rather to the temperature of the fluid than to its passing into the bloodvessels, and producing polyæmia. The experiments of M. Magendie have shown, that if warm fluids be injected into the veins of an animal, a state of artificial polyæmia may be induced, during the existence of which, the pulmonary and cutaneous transpirations are greatly increased. Where, however, there is much erethism present, absorption is but feebly effected. Were it otherwise, inflammatory diseases could hardly fail to be largely augmented by the free use of diluents.

On the whole, then, even in febrile and inflammatory affections, the use of the ordinary internal diaphoretics is uncertain, and generally of no avail; whilst several of them are decidedly injurious by their excitant properties; yet, in many such cases, advantage may be derived from the equalizing influence of the warm bath; and, in minor inflammations, especially of the gastro-pulmonary mucous membrane—as catarrh—the good effect of warm diluents, aided by the warmth and quietude of bed, produce an effect of equalization, which is often most salutary. In no disease, perhaps, has the class of medicines we are considering been more extensively employed than in rheumatism. Its pathology has always been connected with suppression of perspiration. Its very name denotes a rheum, a defluxion, a catarrh, directed to the suffering part, and the cause of such defluxion has been almost always referred to some check given to the cutaneous transpiration. This applies more especially to chronic rheumatism; but the reasoning, and the practice founded upon it, have been extended to acute forms of rheumatism or rheumatic fever, in which the copious exudation, notwithstanding the hot skin, is one of the most striking symptoms. Dover's powder has long been a favorite remedy in this disease; and, when given in proper doses, is often useful, for the reasons previously assigned. The combination is well adapted for diminishing vascular and nervous action; but the indication, in these cases, is surely not to restore suppressed perspiration, but rather to diminish the singular state of erethism, which characterizes that anomalous phlegmasia. It has been suggested, indeed, by Dr. Carpenter, that instead of endeavoring to check the copious acid perspirations of acute rheumatism, we should rather encourage them as the best means of freeing the blood from its undue accumulation of lactic acid; and that in the "sweating sickness," which spread so extensively throughout Europe in the 16th century, no remedies seemed to be of any avail but diaphoretics, "which, aiding the powers of nature, concurred with them to purify the blood of its morbific matter." But the marked efficacy of full sedative doses of opium and of sulphate of quinia in arresting acute and subacute rheumatism, without adding to the perspiration, is not in favor of this view.

In almost all cases, in which the employment of diaphoretics appears to be indicated, the class of sedatives, or refrigerants, or both, will be found more advantageous, for reasons already assigned; and to be more particularly expatiated upon, when the *modus operandi* of those divisions of remedial agents comes to be considered. It is impossible, indeed—as remarked by Sir Henry Holland—with increasing exactness of observation, to escape the conviction, that in febrile and inflammatory disorders, the direct cooling methods of treatment are the safest and most beneficial, and these, accordingly, have been gaining ground to the exclusion of such as were previously in common use.

SPECIAL DIAPHORETICS.

I. *Sedative Diaphoretics.*

1. ANTIMO'NIALS.

The preparations of antimony, that are alone used as diaphoretics at the present day, are *tartrate of antimony and potassa; pulvis antimonialis*, and *precipitated sulphuret of antimony.*

a. ANTIMO'NII ET POTAS'SÆ TARTRAS.—TARTRATE OF ANTIMONY AND POTAS'SA.

Tartar emetic, described elsewhere (page 131), has been regarded by many as the most certain of the antimonial diaphoretics; and it is assuredly more frequently given than any other. When pushed to the extent of inducing nausea—like other nauseant emetics, it is a true and valuable sedative; yet it is most frequently given in fever so as to produce a febrifuge effect without exciting nausea. In such case, as already remarked, it is an uncertain remedy, and nothing exhibits this more strongly than the discordant testimony in regard to it in continued fever. Whilst many consider it to be of great service, others speak slightingly of it. "Of all the numberless febrile diseases," says Dr. Christison, "where antimonial diaphoretics are prevalently given, the only one where my own observation does not concur with that of most others as to their beneficial effects is continued fever. After extensive experience as an hospital physician for twenty years, I must say, that I have seen no substantial reason for the warm commendations of this method of cure by some, either in the marked inflammatory type put on by the disease in the earlier periods, or in the late typhoid form which it has assumed, or in the synochous form in which it appeared in the middle of the term. What may have been, or may yet be, the case of other epidemics, it must be left to others to determine. In the late epidemics of Edinburgh I have seen no good done by it except as a palliative, and not a very trusty one, in abating reaction in the early stages of synochus and typhus."

In this relation it may be well to remark, that antimony has been considered to accelerate the destructive metamorphosis of certain of the elements of the blood, "and, indeed," says Mr. Simon, "since the recent researches of Dr. Mayerhofer, we know more about it than about other drugs of the same class. Without materially altering the proportion of colored corpuscles in the blood, it produces a marked diminution in its other solid ingredients, and reduces the fibrin, the ratio of which is increased in inflammation, to about a third of its usual quantity. Coincidently with this change occur the various known acts of increased excretion; and in the urine, which has been especially examined, the waste products of the economy are found in excess—especially the urea, of which there is discharged half as much again as is normal."

The ordinary dose of tartar emetic, as a diaphoretic, is from one-sixteenth to one-sixth of a grain, given in solution, or in powder. By many, in this country, a combination of nitrate of potassa, calomel and tartar emetic is prescribed under the name of "*Nitrous powders.*" The usual form of preparation of these is the following: *Antim. et potass. tartr.* gr. ⅛; *Potassæ nitrat.* ℈ss; *Hydrarg. chlorid. mit.* gr. ¼ ad gr. ½. M. One of these to be given every two or three hours. They are especially useful, where it is desirable to *touch* the mouth in fever; yet it may be a question, whether there be any advantage from the reputed diaphoretics with which the mild chloride of mercury is combined. In the advanced stages of typhus, accompanied with high encephalic excitement, as manifested by loss of sleep, delirium, &c., good effects have resulted from the use of the tartrate combined with opium; yet these are precisely such cases as are benefited by the use of opium singly; and it has been found equally beneficial in encephalic disturbance supervening on other diseases, and associated with adynamic phenomena.

VINUM ANTIMO'NII, ANTIMO'NIAL WINE (p. 133).—The dose of this solution of tartrate of antimony and potassa, as a diaphoretic, is from ten to thirty drops repeated three or four times in the course of the day. Each ounce of the wine contains two grains of tartrate.

b. PULVIS ANTIMONIA'LIS.—ANTIMO'NIAL POWDER.

Dr. James, of London, about the middle of the last century, acquired great celebrity for a powder which was known under the name of *James's Powder.* This, on analysis, was found to consist of phosphate of lime, with about an equal quantity of oxide of antimony. In accordance with this analysis, a preparation was introduced into the London Pharmacopœia, which resembles in its ingredients the real James's powder, but differs in their proportion. The London Pharmacopœia has the following directions for its preparation. Take of *Sesquisulphuret of antimony*, in powder, a pound; *Horn Shavings*, two pounds; mix and throw them into a red-hot crucible, and stir constantly until vapor ceases to arise. Rub the residue to powder, and put it into a proper crucible. Then apply heat raised gradually to redness, and keep it so for two hours. Rub the residue into a very fine powder. By this process, the animal matter of the horn is burnt away; and the subphosphate, with a little of the carbonate of lime, is left. The sulphur of the sesquisulphuret is expelled by the same agency in the form of sulphurous acid, whilst the antimony takes oxygen from the air, forming antimonious acid, and sesquioxide of antimony. The main constituents, therefore, are antimonious acid and subphosphate of lime. It is of a white color, tasteless, and devoid of odor. "The reputation of James's powder as a diaphoretic," says Sir Henry Holland, "may have depended, in part, on its sedative action on the circulation; but still more, as I believe, upon the sweating regimen employed together with it. The comparative neglect of this regimen, as well as the smaller and less frequent doses of the medicine now used, will explain its lesser efficacy in modern practice, of which we often hear complaint. There is, besides, some reason to presume, that its value was always rated too high."

Antimonial powder, as already remarked (p. 330), is extremely uncertain in its operation, and is generally wholly inert: for these and other reasons it has not been received into either of the two last editions of the Pharmacopœia of the United States. Its ordinary dose is from three to ten grains and more, repeated three or four times in the course of the day. It may be given in pill, or in thick sugar and water.

Some practitioners have more confidence in the empirical "James's powder;" but it, also, is uncertain in its operation; and, accordingly, neither the one nor the other is much used at this time in this country.

c. ANTIMO'NII SULPHURE'TUM PRÆCIPITA'TUM.—PRECIP'ITATED SUL'PHURET OF ANT'IMONY.

The mode of forming this preparation, in the Pharmacopœias of Great Britain and the United States, consists in boiling *sulphuret of antimony* and *solution of potassa* in *distilled water*, for three hours, constantly stirring, and occasionally adding distilled water, so as to preserve the same measure. The liquor is then strained; and, while hot, diluted sulphuric acid is dropped in, as long as it produces a precipitate; the sulphate of potassa formed is then washed away with hot water, and the precipitated sulphuret of antimony is dried and rubbed into fine powder.

Several old antimonial preparations were at one time largely employed; one of these was *Kermes mineral.* It is formed by boiling *sesquisulphuret of antimony* in an *alkaline liquid*, and allowing a reddish powder,—*kermes mineral*,—to be deposited on cooling. If to the filtered mother liquor, a dilute mineral acid be now added, the GOLDEN SULPHURET OF ANTIMONY—an orange-red precipitate—is thrown down; and if the acid be added before the kermes mineral has subsided, an orange-red precipitate is deposited, which is the OXYSULPHURET OF ANTIMONY of the London Pharmacopœia,—the GOLDEN SULPHURET OF ANTIMONY of the Edinburgh, and the PRECIPI-

TATED SULPHURET OF ANTIMONY of the United States Pharmacopœia. This substance is devoid of smell, and of a slightly styptic taste. It is insoluble in water; but is wholly soluble in nitrochlorohydric acid, with the evolution of hydrosulphuric acid.

Precipitated sulphuret of antimony is not inert. It has been given as an emetic; but, like Pulvis antimonialis, is so uncertain in its operation, that it is rarely used. It was an ingredient in *Plummer's Pill*, and is therefore still retained in *Pilulæ Hydrargyri Chloridi Compositæ* of the British Pharmacopœias. The dose, as a diaphoretic, is from two grains to ten, repeated once or oftener in the day.

2. IPECACUAN'HA.

The remarks, made in regard to the tartrate of antimony and potassa as a diaphoretic, are equally applicable to the article under consideration. When given alone, it is an extremely uncertain remedy; but when carried to the extent of inducing nausea, it is a valuable sedative; and, by allaying excited organic actions, produces indirectly diaphoresis in febrile and inflammatory diseases. It is often, however, administered in such cases in so small a dose as to exert probably no action whatever, whilst at the same time the disease may be treated successfully upon general principles.

The dose of powdered Ipecacuanha, as a diaphoretic, is from half a grain to a grain; with such view, however, it is most commonly prescribed in conjunction with opium, as in the officinal preparation,—

PULVIS IPECACUAN'HÆ ET OPII, POWDER OF IPECACUAN'HA AND OPIUM.—(*Ipecac.* pulv., *Opii* pulv. āā ʒj; *Potassæ Sulphat.* ℥j.) This is known in the shops as *Dover's powder*, being an imitation of a well-known formula, already referred to, which was used by Dr. Dover as a diaphoretic. The sulphate of potassa probably exerts little or no action on the economy. It serves a useful pharmaceutical purpose, by virtue of its hardness,—enabling the other ingredients to be minutely divided. Of the *modus operandi* of this compound powder the author has already spoken (p. 331). It is much used by many practitioners; and is doubtless often given in cases for which it is by no means appropriate. It is best adapted for those in which the concentration of vital activity on some internal organ is not excessive; and where the indication appears to be, to allay inordinate action and to procure rest. Hence, a full dose in adynamic and ataxic fever is often beneficial; as well as at the commencement of minor inflammations, as catarrh, sore-throat, &c., when, aided by diluents, it exerts an equalizing influence, inducing general diaphoresis, and, in this manner, breaks in upon the hyperæmia. In cases of acute rheumatism, it is freely exhibited; and some trust to it entirely throughout that painful malady. Acute rheumatism, however, is generally a self-limited disease,—running its course with but little modification from the remedies ordinarily prescribed; and when Pulvis Ipecacuanhæ et Opii seems to be beneficial, it is less, perhaps, from its diaphoretic, than soothing agency on the nervous system, which is so much implicated in that singular affection.

It must be borne in mind, that when given in a large dose, the ipecacuanha may occasion vomiting; and hence it will rarely be retained where nausea, or a tendency to it, exists. For the same reason, diluents which greatly promote its action, and which are themselves diaphoretic under certain circumstances, cannot be freely administered soon after a full dose of the powder has been taken. Where, for example, ten grains of the powder have been taken at bed-time to induce diaphoresis, as in an ordinary case of catarrh, it may be well to wait an hour, and then to give warm wine whey, or a simple diluent,—as tea or gruel.

The ordinary dose of pulvis ipecacuanhæ et opii is ten grains; which may be repeated in the course of three or four hours. Tea or sugared water may be the vehicle. Ten grains contain one of opium and one of ipecacuanha; but the former is probably the most important constituent.

VINUM IPECACUAN′HÆ, WINE OF IPECACUAN′HA (p. 137.)—The dose of this officinal preparation, as a diaphoretic, is from ♏x to fʒss; and it not unfrequently forms part of diaphoretic mixtures, prescribed in febrile and inflammatory affections. When associated with the tincture or wine of opium, its action resembles that of the preparation last described.

8. O′PIUM.

The effects of this valuable drug on the nervous system generally are explained under NARCOTICS. On the nerves of the skin, its agency is shown by a sense of itching or pricking over the surface, and occasionally by a cutaneous eruption. When taken in very large sedative doses, all its preparations, but especially those of morphia—according to the author's experience—induce diaphoresis; and where opium has been taken for the purpose of destroying life, the perspiration induced by it has been at times excessive. In a fatal case, the sheets of the bed were completely soaked to a considerable distance around the body.—(Christison.)

The effects of opium on the general system—as elsewhere shown—are altogether relative, and dependent upon the dose. In a small dose, it is excitant; in a large dose, sedative; and, accordingly, there are pathological conditions in which good effects might result from it in a large dose, whilst the same morbid condition might be aggravated by a smaller. For example, in febrile and inflammatory cases, a small dose might add to the existing evil, and render the skin more hot and dry, whilst a large dose might reduce the organic actions, and thus prove indirectly diaphoretic. The reader is, however, referred to another part of this work for a farther exposition of these views. Sir Henry Holland expresses the belief, that of the various internal means for obtaining diaphoresis, opium, in one or other of its forms, is the most uniformly certain and beneficial.

Opium is rarely, however, administered alone as a diaphoretic. It is generally combined with ipecacuanha, or tartrate of antimony and potassa.—See Pulvis Ipecacuanhæ et Opii (p. 336).

II.—*Excitant Diaphoretics.*

4. LIQUOR AMMO′NIÆ ACETA′TIS.—SOLU′TION OF AC′ETATE OF AMMONIA.

Solution of acetate of ammonia, formerly called *Spirit of Mindererus*, is best prepared by saturating *diluted acetic acid* with *carbonate of ammonia.* If quite neutral, it produces no effect either on turmeric or on litmus paper. When pure it is entirely colorless.

Difference of sentiment has existed amongst observers in regard to this solution, as to whether it be excitant or sedative; nor is the difference confined to this point. Whilst some have the greatest confidence in it as a febrifuge, others consider it to be devoid of action on the economy. Four ounces were taken at once; and, soon afterwards, four ounces more, without any sensible effect.

The author sometimes prescribes it in fever; but more from its serving a temporizing purpose, than for any marked febrifuge power which he considers it to possess. It is often given in other diseases of excitement; sometimes alone, but frequently along with antimonials, nitrate of potassa, &c. As in the case of other diaphoretics, its action may be promoted by the use of diluents, and by external warmth. The ordinary dose is from f℥ss to f℥iss, which may be repeated four or five times in the day.

5. AMMO′NIÆ CAR′BONAS.—CAR′BONATE OF AMMO′NIA.

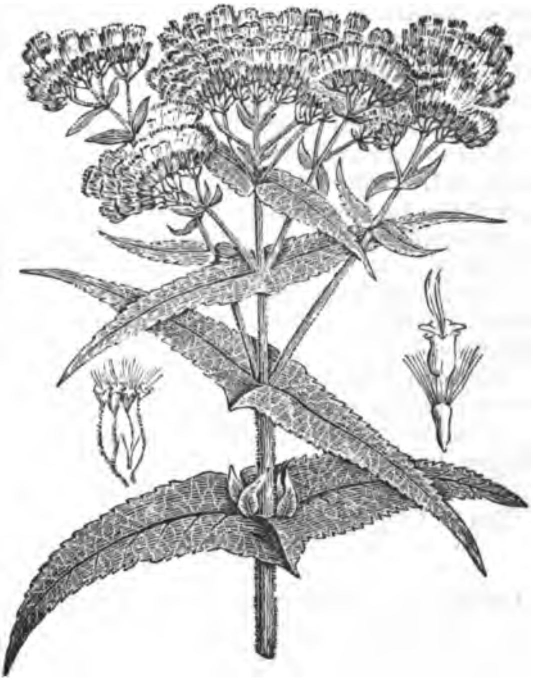
Carbonate of ammonia—as elsewhere stated—is an active excitant; and, like other excitants, proves diaphoretic under certain circumstances. It is rarely, however, given alone as a diaphoretic; and not often in combination. Associated with opium, it is occasionally prescribed in protracted ataxic and adynamic fevers; and in acute rheumatism, it has been given by some in association with guaiac, but on no very rational principle. At the present day it is by no means frequently used. It is recommended, that its diaphoretic operation should be assisted by diluents and warm clothing, which are themselves diaphoretic agents. The dose as a diaphoretic is from gr. x to ℈j; and a good vehicle for its administration is almond emulsion. Sugared water answers, however, every purpose.

Liquor ammoniæ, *Solution of Ammonia*, is administered by some as a diaphoretic, under the same circumstances as carbonate of ammonia. The dose is ♏iv to ♏xx, in sugared water, or properly diluted.

Ammoniæ citras, *Citrate of Ammonia*, which is commonly prepared by saturating the ammonia of carbonate of ammonia with fresh lemon-juice, is occasionally used as a diaphoretic both in the still and effervescent state.

6. EUPATO'RIUM.—THOR'OUGHWORT.

Fig. 75.



Eupatorium perfoliatum.

EUPATORIUM PERFOLIATUM, *Thoroughwort*, *Boneset*, SEX. SYST. Syngenesia Æqualis; NAT. ORD. Compositæ Corymbiferæ, is an indigenous plant, common in almost all parts of the United States; inhabiting moist places, and flowering from the middle of summer to the close of October. The tops and leaves are officinal in the Pharmacopœia of the United States.

No analysis has been made of it; but its medical virtues, which appear, from the taste, to consist in part of bitter extractive, are communicated to water and to alcohol.

The virtues of Eupatorium as a diaphoretic are esteemed by some to be very powerful, and to succeed when other excitant diaphoretics have failed. Hence it has been given freely in acute and chronic rheumatism. The tonic properties, which it possesses at the same time, render it especially adapted for cases in which a diaphoretic and tonic influence is demanded. In very large doses it may prove emetic.

As a diaphoretic, it is rarely given in substance. The ordinary dose of the powder is from ℈j to ʒss. The infusion is generally prescribed.

INFU'SUM EUPATO'RII, INFU'SION OF THOR'OUGHWORT.—(*Eupator.* ℥j; *Aq. bullient.* Oj.) This should be taken warm and freely, the patient remaining in bed. It has been very strongly recommended by Dr. Peebles, of Petersburg, Virginia, in influenza,—given so as to keep up a nauseant effect on the system.

EUPATO'RIUM TEUCRIFO'LIUM, *Wild Horehound*,—which grows in low wet places, is especially abundant in the Southern States, and flowers from August to November,—possesses similar virtues with E. perfoliatum. The whole herb was formerly officinal in the secondary list of the Pharmacopœia of the United States.

7. SPIR'ITUS ÆTHERIS NI'TRICI.—SPIRIT OF NITRIC ETHER.

This preparation, whose general properties are given elsewhere (p. 298)—has been described as possessing the ordinary excitant properties of the ethers and alcohol. It may, consequently, prove diaphoretic, and be beneficial in fevers of the adynamic kind. It is not so easy to see how it can be refrigerant; although it is so regarded by many. There is no single article in the catalogue of the Materia Medica, which is more frequently prescribed by the routinist in febrile cases in general. Fortunately, it is never given in large quantities, and, therefore, not much harm results; yet it is difficult to see how it can be appropriate where the vascular action is excessive, as in our ordinary febrile and inflammatory affections. By many it is associated with the liquor ammoniæ acetatis; by others, with antimonials,—the latter not being a very philosophical combination, as one of the diaphoretics is excitant, the other sedative. With more propriety, it has been advised in combination with a small quantity of compound spirit of ammonia, and prescribed in the low stage of fevers. Often, perhaps,—especially in the febrile affections of children,—it is prescribed in the dose of a few drops, without the practitioner having much, if any, confidence in its diaphoretic powers, but where it is necessary to do something. Its dose, as a diaphoretic, is f℥ss to f℥ij, in water.

8. CAM'PHORA.—CAMPHOR.

Camphor—whose general properties are described under Excitants—by virtue of its excitant powers, is diaphoretic; yet it is rarely given alone. Combined with antimonials, as tartrate of antimony and potassa, it is prescribed occasionally in fevers of the adynamic kind; yet the combination seems scarcely to be philosophical, inasmuch as one article is diaphoretic by virtue of its excitant, the other of its sedative agency. It has been elsewhere shown, that in long-protracted fevers of the adynamic and ataxic kind it is often associated with opium.

The ordinary dose as an excitant diaphoretic is ten grains, given in the form of a pill or emulsion. Its officinal preparations are scarcely ever prescribed as diaphoretics.

9. GUAI'ACUM.—GUAI'AC.

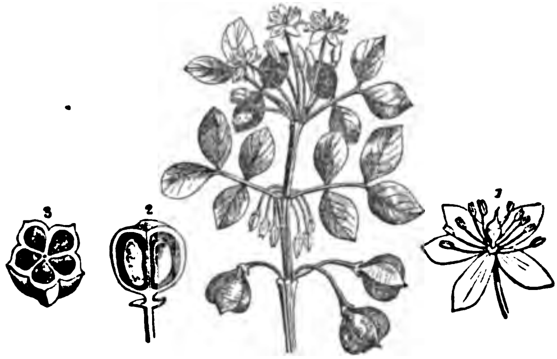
Both the wood of *Guaiacum officinale*—Guai'aci Lignum and the concrete juice—Guai'aci Resi'na, *Guaiac*—are officinal in the pharmacopœias of Great Britain and this country. They have been long employed in Europe, where they were introduced by the Spaniards soon after the discovery of the New World.

Guaiacum officinale; Sex. Syst. Decandria Monogynia; Nat. Ord. Zagophyllaceæ (Lindley), is a large tree indigenous in the West Indies, particularly in Saint Domingo and Jamaica. On the continent of Europe, the bark is much used, and it appears to contain more of the virtues of the tree than the wood.

1. **GUAI'ACI LIGNUM, GUAI'ACUM WOOD,** *Lignum Vitæ,* is an extraordinarily

hard and tough wood, which is used for making pestles, block-sheaves, &c. It is imported in logs or billets, consisting of a broad grayish-yellow alburnum, and a dark greenish-brown or greenish-black duramen, the latter of which is the denser of the two. The specific gravity of the whole is 1·333, so that it sinks in water. Guaiac wood of the shops, *Rasura Guaiaci*, consists of the turnings from the workshop of the turner, and is a mixture of both alburnum and duramen. It is almost devoid of smell, unless when rubbed, rasped, or heated, when it has an aromatic odor. It excites a bitter, acrid, biting taste on the palate. When analyzed by Trommsdorff, it was found to contain 26 per cent. of resin—probably the guaiac, to be described presently,—with a bitter piquant extractive matter, which was most abundant in the alburnum; the resin abounding in the central wood or duramen. The central wood has generally been preferred, and the alburnum has even been directed to be discarded by some, under the idea that its activity is altogether dependent upon the resin it contains. This, however, as has been remarked by an able pharmacologist, Dr. Christison, is a mistake; and even if we were not to accord with him, that the more acrid alburnum ought, perhaps, to be preferred, we might still object to the rejection of the acrid principle.

Fig. 76.



Guaiacum officinale.

1. Corolla and stamens. 2. Seeds. 3. Fruit.

Guaiacum yields its virtues to both alcohol and water, but not equally well to both. The resinous matter is of course not wholly imparted to the latter. Alcohol has been found to dissolve 21 per cent.; boiling water 10 per cent. according to one experimenter; 17 according to another;—yet, the most favorite preparations of guaiacum wood have been at all times decoctions; which would rather favor the idea, that the activity may be greatly resident in the acrid principle.

Guaiacum wood is an excitant diaphoretic, less perhaps on account of the acrid extractive it contains than of the resin, which is nearly insoluble in water. It is rarely, however, administered as a diaphoretic. It has been given in chronic rheumatism in the form of decoction; and has frequently been prescribed—as will be seen elsewhere—as a eutrophic, in diseases of the system of nutrition,—in scrofulous, syphilitic, and syphiloid affections, for example. Where the active excitant properties of guaiacum are wanted, the resin is almost always directed.

A simple *decoction* of guaiacum may be made by boiling an ounce of the shavings or turnings in a pint and a half of water down to a pint. To produce diaphoresis, this should be given warm, in the dose of four fluidounces, repeated every five or six hours if necessary.

Guaiacum wood is an ingredient in *Decoctum Sarsaparillæ compositum*, and *Syrupus Sarsaparillæ compositus* of the Pharmacopœia of the United States.

2. GUAI'ACI RESI'NA, GUAI'AC, or as it has been erroneously called *Gum guaiac*, is an exudation from the tree, spontaneously, or by means of incisions. It is obtained, also, by taking billets of the wood, boring a hole lengthwise through them, and putting one end in the fire; the other being so placed that the melted resin, which runs through the hole as the wood burns, may be received in a calabash. This appears to be the process usually followed; but it is likewise obtained in small quantities by boiling chips or sawings of the wood in salt water, when the resin swims on the top, and may be skimmed off. The salt is added to raise the boiling-point of the water.

Guaiac, as found in the shops, is usually in irregular lumps, often containing chips of wood and other impurities. These are of a brownish-red or brownish-yellow color at the surface, when fresh; but they become greenish on exposure to air. The fracture is brilliant and resinous. Specific gravity about 1·23. When rubbed, it has a slight balsamic odor, with little taste; but leaves a sense of heat and pungency in the mouth. The whole of the resin is soluble in alcohol; the impurities alone being left. Water dissolves about 9 per cent.; and the solution has a sweetish taste. The soluble matter is probably extractive, which Mr. Brande found to exist in it in the proportion of 9 per cent. The resin, considered by some to be peculiar, and which has been called *Guaiacin* and *Guaiacic acid*, forms, according to the same analyst, 91 per cent. Ether acts less energetically on guaiac than alcohol; and the fixed and volatile oils scarcely at all. This last circumstance enables an adulteration, which is sometimes practised on the continent of Europe, to be detected. The resin of the pine or colophony is colored green, and mixed with it; and the adulteration is detected by the partial solubility of the suspected article in hot oil of turpentine, which dissolves the colophony, but does not act on the guaiac. It exhales, also, a terebinthinate odor when heated.

Like the wood of guaiacum, the resin is possessed of excitant properties; and, when aided by warm drinks—the patient being kept in bed—it proves diaphoretic. It is generally, however, associated with nitrate of potassa, ipecacuanha and opium, or antimonials; and is most frequently prescribed in acute rheumatism after the more active period has passed away; and in chronic rheumatism. In such cases it is, at times, arbitrarily combined with sulphur. It has likewise been given, on account of its excitant properties, in chronic atonic gout.

The dose of powdered guaiac is from gr. x to ʒss, given in the form of pills or bolus. The London and Edinburgh Pharmacopœias have a MISTURA GUAIACI or *Guaiacum Mixture*, which according to the former, is composed of *Guaiac* ʒiij; *Sugar* ℥ss; *Mucilage of gum arabic* fʒss; *Cinnamon water* f℥xix. The guaiac is rubbed with the sugar; then with the mucilage; and to these, whilst rubbing, the cinnamon water is gradually added. The dose is f℥ss to f℥ij, two or three times a day.

TINCTU'RA GUAI'ACI, TINCTURE OF GUAI'AC.—(*Guaiac.* pulv. ℔ss; *Alcohol.* Oij.) This tincture is not unfrequently given in the rheumatic and gouty cases referred to above. When mixed with water, the guaiacum is separated. It may be taken in this manner; but the best plan is to mix the tincture with mucilage before the water is added; and sweeten with sugar, as in the following form:—℞. *Tinct. guaiac.* fʒvj; *Mucilag. acaciæ* f℥ss; *Aquæ cinnam.*, vel *Aquæ pur.*, f℥ivss. —M. Dose, a fourth part, four times a day. The ordinary dose of the tincture of guaiac is fʒj to fʒiij.

TINCTU'RA GUAI'ACI AMMONIA'TA, AMMO'NIATED TINCTURE OF GUAI'AC.—(*Guaiac.* pulv. ℥iv; *Spirit. ammoniæ aromat.* Oiss.) In consequence of the addition of the aromatic spirit of ammonia, this tincture is, of course, more excitant than the preceding. It is applicable, however, to the same cases; and requires the same admixture as the simple tincture. The dose is fʒj to fʒij.

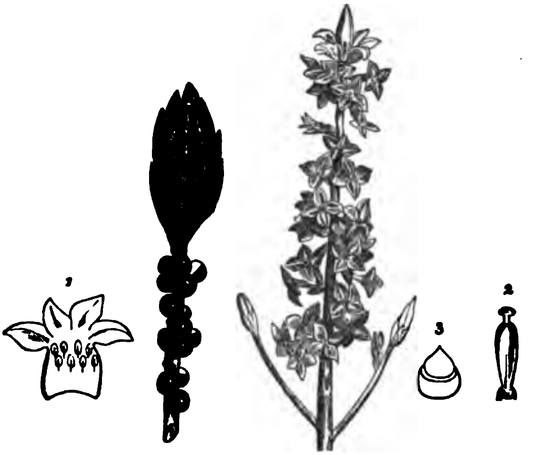
10. MEZE'REUM.—MEZE'REON.

The mezereon of the shops is the bark of *Daphne mezereum and Daphne gnidium*; SEX. SYST. Octandria Monogynia; NAT. ORD. Thymelaceæ (Lindley). The British colleges refer it entirely to *Daphne mezereum*, *Common mezereum* or *Spurge Olive*, a shrub which is common in shady woods throughout Central and Northern Europe, as well as in the northern parts of Asia, and is generally regarded to be indigenous in Great Britain. Dr. Christison, however, considers it a "doubtful native" of that country. It is occasionally seen in the gardens of this country, being much admired for its beautiful fragrant pink flowers, and its splendid clustered scarlet berries. There is a variety, however, with white flowers, and with berries of a yellow or orange color. It flowers from February to April inclusive, according to the greater or less temperature of the climate.

In England and Scotland, the bark of the root is alone used; in this country, the bark of the stem is recognized, which is imported from Germany. It appears to be immaterial which is employed; such, at least, would seem to be the opinion of the framers of the Dublin and United States Pharmacopœias. Others, however, consider the root bark to be more active. It is commonly collected in the spring, from the root, where the root bark is employed; or from the bark of the stem and larger branches—as in Germany—when it is folded into small bundles, and dried for medical use. As we meet with it in the shops, it is in strips of greater or less length, folded in small bundles. It is tough, pliable, and fibrous, of a brown color externally, and white and cottony within. Its taste is sweetish at first, but this is soon followed by great acridity. It has no smell when dried; but when fresh the odor is faint and unpleasant.

Mezereon yields its virtues to water. These seem to be referable to an acrid resin, which, there is some reason to suppose, is a compound of an acrid, vesicating, fixed oil, and another substance, and which is made soluble in water by means of other constituents of the bark. All the parts of mezereon are highly acrid, so that—as elsewhere shown—when applied to the skin, it excites irritation and vesication. When taken internally, it is therefore, powerfully excitant; and in large doses an acrid poison.

Fig. 77.



Daphne mezereum.

1. Stamens. 2. Pistil. 3. Part of berry and seed.

Like guaiacum wood, it has enjoyed reputation as a eutrophic or alterative in the treatment of syphilitic and syphiloid diseases, and in chronic cutaneous affections, and morbid states of the system of nutrition in general. Its virtues in these relations are, however, treated of in another place. Like guaiacum wood, again, it has been given in rheumatism and gout as an excitant diaphoretic, but it is not much employed. A simple DECOCTION OF MEZEREON is officinal in the Edinburgh and Dublin Pharmacopœias. It may be prepared of *Mezereon bark*, in chips, ʒij; *Liquorice root*, bruised, ℥ss; *Water*, Oij; boiled down to a pint and a half. The dose of this in chronic rheumatism is f℥iv to f℥viij, two or three times a day.

Mezereon is an ingredient in *Decoctum Sarsaparillæ compositum* and *Extractum Sarsaparillæ fluidum* of the Pharmacopœia of the United States.

11. SAS'SAFRAS RADI'CIS CORTEX.—BARK OF SAS'SAFRAS ROOT.

This drug—as elsewhere shown—is excitant by virtue of its essential oil; and, like other excitants, may—under certain circumstances—prove diaphoretic. Dr. Wood, of Philadelphia, remarks, that "its possession of any peculiar tendency to the skin, independently of its more excitant property, is quite doubtful." This would apply perhaps to all excitant diaphoretics, which probably act—as the author has endeavored to show—in all cases indirectly.

When taken in the form of hot infusion or tea, aided by the warmth of bed and warm drinks, this drug certainly proves diaphoretic, and might therefore be given, with advantage, in incipient catarrh, and in slight local inflammations. It has, likewise, been prescribed in chronic rheumatism; and, as will be elsewhere seen—has formed part of diet-drinks administered in syphilitic and other *vices* of the system of nutrition. It is an ingredient in *Decoctum Sarsaparillæ compositum* of the Pharmacopœia of the United States; although its volatile oil cannot fail to be driven off during the boiling.

O'LEUM SAS'SAFRAS, OIL OF SAS'SAFRAS, is employed in the same cases as sassafras itself; and is an ingredient in *Syrupus Sarsaparillæ compositus* of the Pharmacopœia. Its dose is from ♏ij to ♏x on sugar, or in some warm fluid.

12. MELIS'SA.—BALM.

The leaves of *Melissa officinalis* or *Common Balm;* SEX. SYST. Didynamia Gymnospermia; NAT. ORD. Labiatæ—are officinal in the secondary list of the Pharmacopœia of the United States. The plant is a native of the South of France; but has been introduced into this country, where it is cultivated for use in gardens. The flowers appear in July, prior to which the plant should be gathered.

Balm has an aromatic bitter taste, and a strong peculiar odor, which is preserved by the dried plant, provided the desiccation is accomplished quickly; but is lost by time. On analysis, it yields volatile oil, which resembles in smell oil of lemons;—resin; bitter extractive matter; gum; tannic acid and woody fibre. The volatile oil is not in great quantity. The leaves yield their virtues to hot water.

Infusion of Balm, Balm Tea, is stimulant by virtue of its essential oil; but as this is only in quantity sufficient to afford an agreeable flavor to the infusion, it cannot have much remedial agency. In domestic practice, it has been esteemed an excitant diaphoretic, when taken hot; but the effects are probably referable to the hot water. The author has often seen it exhibited; and is disposed to arrive at this conclusion. It may be given in catarrhal and other affections in which a gentle excitant influence on the skin is considered to be indicated.

13. ASCLE'PIAS TUBERO'SA.—BUTTERFLY WEED.

The root of *Butterfly weed, Pleurisy Root*, is in the secondary list of the Pharmacopœia of the United States. It belongs in the SEX. SYST. to Pentandria Digynia; and is in the NAT. ORD. Asclepiadeæ. This species of Asclepias flourishes in every part of the United States, and flowers in June and July,—the flowers being of a beautiful reddish orange color. It is especially abundant in the Southern States. Dr. Lockwood advises, that the root should be collected about the first of October, be cut in transverse slices, dried in the shade, and as soon as sufficiently dried, pulverized and bottled.

The root, as seen in the shops, is large and irregularly tuberous; of a brown color externally, and white and striated within. In its fresh state, it has a nauseous subacrid taste. Its virtues are imparted to boiling water.

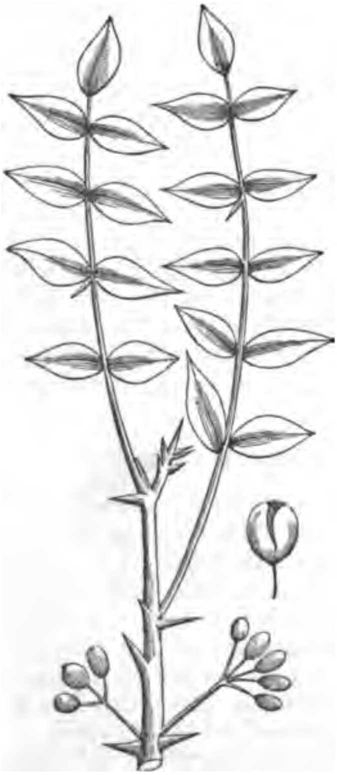
Asclepias tuberosa belongs, doubtless, to the class of excitant diaphoretics; and, in large doses, is said to be cathartic. It has been prescribed in catarrh, and in inflammatory affections of the chest in general, especially after bloodletting; and, in consequence of its fancied efficacy in pleurisy especially, has received one of its appellations.

The dose of the powdered root is gr. xx to ʒj, taken three or four times a day; but this is not the best form as a diaphoretic. The decoction or infusion is generally employed for this purpose, in the proportion of one ounce of the root to a quart of water;—the dose being a teacupful every three or four hours, taken warm, and the patient being kept in bed, and warm diluents allowed. Dr. Lockwood says, that the warm decoction acts with as much certainty as a diaphoretic, as jalap does as a cathartic. (?)

14. XANTHOX'YLUM.—PRICKLY ASH.

Xanthoxylum is the bark of *Xanthoxylum Fraxineum;* Sex. Syst. Diœcia Pentandria; Nat. Ord. Terebinthaceæ,—Xanthoxyleæ (Lindley), a native of the United States, excepting of the southern portion, growing in woods and in moist shady places; and flowering in April and May.

Fig. 78.



Xanthoxylum fraxineum.

The bark, as met with in the shops, is in quilled pieces with an ash-colored epidermis; that of the small branches having strong prickles. It is very light and brittle; nearly without smell, and of a taste sweetish at first, and slightly aromatic, and afterwards bitterish and acrid. Its virtues are communicated in part to boiling water. On analysis by Mr. Staples it was found to contain volatile oil, a greenish fixed oil, and resin, as its chief constituents.

Xanthoxylum belongs obviously to the class of excitant diaphoretics, and is considered to resemble in its action, mezereon and guaiac. It has been administered in similar cases, and is said by Dr. Bigelow, of Boston, to enjoy considerable reputation in chronic rheumatism. The dose of the powder is gr. x to ʒss, given three or four times a day. It is sometimes directed in decoction,—an ounce of the drug being boiled in three pints of water to two; a pint of this is taken in divided doses during the day. Boiling can scarcely fail, however, to dispel some of its active constituents; and therefore cannot be a good form of preparation.

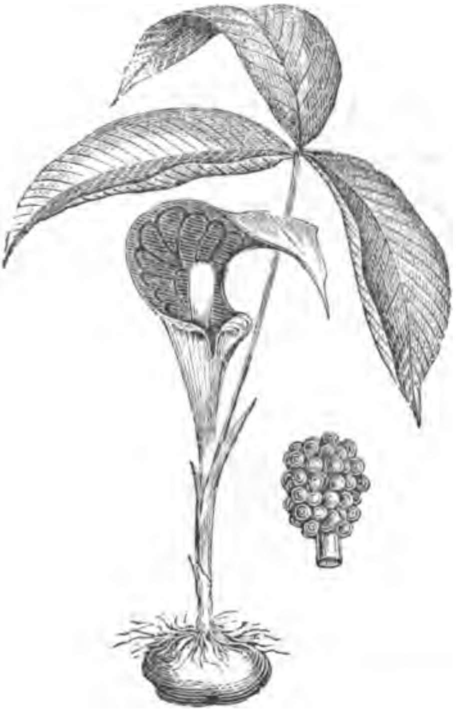
Xanthoxylum is in the secondary list of the Pharmacopœia of the United States.

Besides the excitant diaphoretics already described, the Pharmacopœia of the United States has the following in its secondary list.

15. Ara'lia Spino'sa, *Angelica Tree Bark. Aralia Spinosa, Angelica Tree, Toothache Tree,* or *Prickly Ash;* Sex. Syst. Pentandria Pentagynia; Nat. Ord. Araliaceæ, is an indigenous shrub, which grows chiefly in the Southern and Western States, and is cultivated in the gardens at the north as an ornamental plant. It flowers in August and September. The bark is generally given in decoction (*Aral. spinos.* ℥j; *Aquæ* Oiss). Boil to a pint. Dose f℥iss to f℥ij, three or four times a day in chronic rheumatic cases.

16. Arum, *Dragon Root, Indian Turnip,* is the cormus of *Arum Triphyllum, Dragon Root, Indian Turnip* or *Wake Robin;* Sex. Syst. Monœcia Polyandria; Nat. Ord. Aroideæ—Araceæ (Lindley). The plant is indigenous and common in the United States; and, like every species of arum, contains an acrid principle, when fresh, which can be driven off by heat, and is not imparted to water or alcohol, the ordinary pharmaceutical menstrua. By drying, the principle is lost, and the root becomes inert, containing a large quantity of starch, which can be separated from it and taken as an aliment. It is sometimes used, when fresh, as a diaphoretic and expectorant. The recently dried root is usually given, but it has not much efficacy. The dose is ten grains.

Fig. 79.

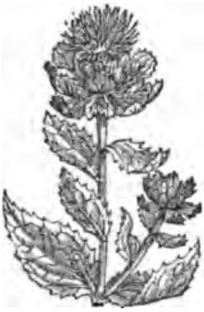


Arum triphyllum.

17. Car'thamus, *Dyers' Saffron.* The flowers of *Carthamus tinctorius, Dyers' Saffron, Bastard Saffron* or *Safflower;* Sex. Syst. Syngenesia Æqualis; Nat. Ord. Compositæ Cynarocephalæ—a plant, which is indigenous in Egypt and the Levant, but is cultivated in Europe and in this

country, where it bears the name of *American Saffron*—are sometimes administered in warm infusion (*Cartham.* ℥ss, *Aquæ* Oj), as a diaphoretic, in domestic practice, to favor the eruption of the major exanthemata. They are rarely prescribed by the physician; and the same may be said of

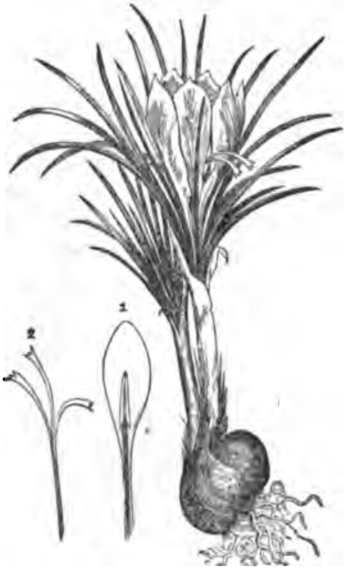
Fig. 80.



Carthamus tinctorius.

18. Crocus, *Saffron;* the stigmas of *Crocus sativus*, *Autumnal Crocus;* Sex. Syst. Triandria Monogynia; Nat. Ord. Iridaceæ;—a native of Asia Minor, and Eastern Europe; but cultivated in various parts of the world. Saffron is in the primary list of the Pharmacopœia of the United States, but only because it enters as a coloring agent into various preparations; in some of which it is retained as a relic of antiquity, not because of any valuable remedial virtues. In domestic practice, it is still given in the same cases as carthamus, in the form of *Saffron Tea.* Its nominal dose is gr. x to ʒss; but it is almost inert.

Fig. 81.



Crocus sativus.

1. Petal and Stamen. 2. Style and Stigmas.

It enters into *Pilulæ Aloes et Myrrhæ*, *Tinctura Aloes et Myrrhæ; Tinctura Cinchonæ Composita*, and *Tinctura Rhei et Sennæ*, of the Pharmacopœia of the United States.

19. Sambu'cus, *Elder Flowers.* The flowers of *Sambucus Canadensis* or *Common Elder;* Sex. Syst. Pentandria Trigynia; Nat. Ord. Caprifoliaceæ—a shrub, which is very common in the United States, flowering from May to July—are sometimes used as a diaphoretic, in the form of infusion. They contain a small quantity of volatile oil, which may be obtained by distillation with water,—constituting *Aqua Sambuci* or *Elder Flower Water*, of the British Pharmacopœias, which is used to flavor mixtures and emulsions.

III. *Topical Diaphoretics.*

20. CALOR'IC.

Along with the internal agents already described, caloric in various forms of baths is often employed as a topical diaphoretic. Of the effects of baths on the animal economy in health, mention has been made elsewhere. (See the author's *Human Health*, p. 358; Philada. 1844.) It remains to speak of them here as therapeutical agents of the diaphoretic class.

a. WARM AIR BATH.

Air, when heated to from 85° to 100° of Fahrenheit's scale, and placed in contact with the cutaneous surface, is a gentle excitant to the secretory apparatus of the skin, and occasions copious perspiration. When heated to a greater degree, it forms the HOT AIR BATH, which in place of inducing diaphoresis, may cause an amount of excitement that may arrest the secretion. Warm air has been applied in various ways; either by raising the bed-clothes from the body by means of a wicker cradle, and then allowing the tube from a lamp to pass under the bed-clothes, or by burning alcohol in a cup or saucer under the same;—in either case, the patient's head and neck being outside the bed-clothes. It might be applied also by means of one of the ordinary fumigating apparatuses, in which vapors are made to come in contact with the body; or by heating the air of an apartment by means of a cockle or some appropriate stove. Dry heated air is not, however, inhaled with entire impunity in all cases. It is greedy of moisture; and, where the lungs are diseased, may occasion much distress in respiration. At the temperature of 85° to 90°, applied to the surface in either of the first two modes, it is said by Dr. A. T. Thomson to be not stimulating,—to have a soothing effect on the nervous system,—and to be "more certainly productive of sweating than either the warm water bath or the vapor bath." A bath of this kind has been found useful in chronic rheumatism, and in various neuralgic affections of deep-seated parts; stiffness of the joints, &c. It is said, also, to have exerted a beneficial agency in cutaneous affections, especially of the squamous kind. Where the blood has receded from the surface, as in cases of congestive fever, or in spasmodic cholera, the bath is rendered more excitant, by elevating the temperature. It then becomes a true excitant, and, accordingly, is treated of under another head. (See EXCITANTS.)

b. WARM VAPOR BATH.

The warm vapor bath holds a medium place between the last and the warm water bath. The vapory medium is a better conductor of heat than air, and worse than water; hence its temperature, to produce analogous effects, must be higher than that of the warm water bath. The vapor bath differs, too, according to the mode in which it is applied. In the case of the *Russian vapor bath*, the whole body is exposed to the vapor, and it is of course inhaled into the lungs. In other cases, the vapor is made to come in contact with the whole of the body, except the head,—none passing into the lungs. In another work, already referred to (*Human Health*, p. 47), the author has described the arrangement and effects of the Russian bath, which is used mainly as a hygienic agent.

Owing to these differences between the vapor bath and the warm water bath, it has been laid down, that the temperature of the former should always exceed that of the latter. If, however, the whole body be immersed in vapor, so that it is inhaled, it is recommended, that the temperature should be a little less than if the body alone were exposed to it; as the inhalation of vapor arrests the cooling process of evaporation from the lungs.

The following is given on excellent authority,—that of Sir John Forbes,—as a comparative view of the heating powers of water, and of vapor, according as the latter is breathed or not.

	WATER.	VAPOR.	
		Not breathed.	Breathed.
Tepid Bath,	85°— 92°	96°—106°	90°—100°
Warm Bath,	92°— 98°	106°—120°	100°—110°
Hot Bath.	98°—106°	120°—160°	110°—130°

In the work already cited, and in another part of the present, the author has stated the effects of the hot vapor bath to be—like those of the hot water bath—powerfully excitant, and therefore, not properly falling under consideration here. Those of the warm vapor bath are moderately excitant, but powerfully diaphoretic; producing a general equalizing influence, followed by a feeling of languor, and by somnolency. Hence, it may be used with marked advantage in slight inflammatory affections, especially in those of the gastro-pulmonary mucous membrane. In such cases, it would obviously be better, that the bath should be so administered, that the air loaded with vapor should be received into the air-passages. It may also be of service in dry chronic cutaneous eruptions, and in rheumatic affections; although in these last the hot vapor bath proves more serviceable.

For therapeutical purposes, the patient may be covered with an oil silk garment, which ties about the neck, and is made to fall at a distance around him. A tube, connected with a kettle of boiling water, placed over a spirit lamp, may then be passed under the oil-cloth at such a distance from the patient's body as to prevent his being scalded; and in this way warm vapor may be made to come in contact with it. In certain of the public and private bathing establishments an appropriate apparatus is provided for taking a steam bath at any temperature.

Sometimes the vapor is medicated by impregnating it with aromatic oils from plants boiled in the water, or from some volatile oil being added to it in the vessel; but although these may somewhat augment the excitant action of the vapor, there is no great reason to believe that much remedial influence has been exerted by them. Of other vaporous agents that may be added, mention is made under those agents.

c. WARM WATER BATH.

The *tepid bath*,—the temperature of which may be ranged between 75° and 90° of Fahrenheit,—may be regarded as refrigerant rather than diaphoretic; and, therefore, its therapeutical effects fall more properly under Refrigerants, and are considered elsewhere. The ordinary temperature of the warm bath is between 90° or 92° and 96° or 98°. Even when as low as 90°, and lower, a pleasurable feeling of warmth is experienced on immersion, because the temperature of the air is generally below this point, and, accordingly, the body is commonly parting with more caloric.

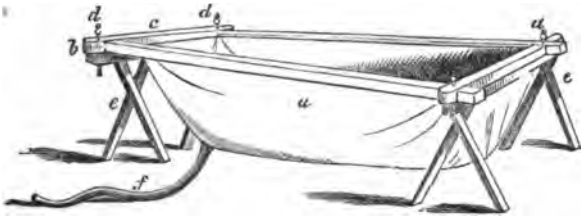
Although when first applied, the effect may be to gently excite the secretory organs of the skin, the great influence is the equalization exerted by it, owing to the blood being solicited everywhere to the surface. Under this agency, inflammatory concentrations are broken in upon; and hence it becomes one of the most beneficial remedies in minor degrees of internal hyperæmia especially; and, likewise in cases where the inflammatory mischief is to a greater amount. Its main action is, indeed, sedative,—that is, the gentle excitation first produced by it in the cutaneous system is so speedily followed by sedation, that the latter effect is predominant. Accordingly, although, on immersion, the pulse may become more frequent, and the respiration somewhat accelerated, languor and evidences of diminished action soon succeed, with impairment of muscular power, a tendency to faintness, and somnolency. Hence it is used by the surgeon to relax constricted parts, as in cases of luxations, and hernia, and of the passage of urinary or biliary concretions.

In almost all acute phlegmasiæ, after more powerful sedatives have been employed, the warm bath is found of decided service, on the principle just mentioned; hence, in thoracic and abdominal inflammations, more especially when occurring in children, it is much used, and there is no remedy more soothing. In eruptive fevers, particularly where the eruption does not appear kindly, its beneficial action is often marked; and it is especially applicable to cases where the temperature of the surface is depressed, and the circulatory action feeble. In such cases, it ought to approach the hot bath in temperature; and many cases absolutely require the strong excitant influence of water heated above the temperature of the body. In chronic inflammations, the properly directed use of the warm bath is not less serviceable. In dyspepsia, too, it exerts a salutary effect, especially when conjoined with friction on the surface; and in various spasmodic diseases,—as convulsions, particularly of children,—its soothing and equalizing influence is admitted by all. There is, however, so much inconvenience in its employment in the last case, when an infant is suddenly taken with convulsions, that, by some, as by Dr. Dewees, it was abandoned, and friction substituted.

Like the warm vapor bath, it may be beneficial in various dry cutaneous diseases, and in rheumatic affections; and there are cases of amenorrhœa and of dysmenorrhœa,—in the latter especially, when accompanied by a membranous secretion, the result of an excited action of the secretory vessels of the lining membrane of the uterus, —in which it is of decided service.

Dr. A. T. Thomson has invented an apparatus, which he regards as the simplest warm bath. It consists of a hammock *a*, of India rubber cloth, which is extended upon two long poles *b b*, passed through a broad seam on each side of the hammock, and kept asunder by the cross pieces, *e*, which are attached to the poles by the thumb screws *d d d*. At one end of the hammock is an air pillow, which can be readily blown up; and below it is a flexible tube *f*, made of the same material as the hammock, by which any water it may contain can be readily drawn off. When the poles are fixed, as in the marginal figure, and the open end of the flexible tube is twisted round one of the thumb screws, the bath is ready to receive the water. It may be supported upon two chairs, or upon folding tressels *e e*. The advantage of this bath, according to Dr. Thómson, is, that it requires a very small quantity of water compared with that demanded for other baths, and that when the bathing is completed, the poles and the folding tressels can be placed aside in a small closet, or in the corner of a dressing room, and the hammock, when dried, be put into a drawer.

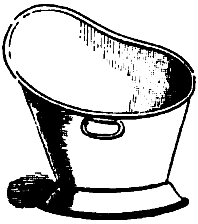
Fig. 82.



Warm Bath.

PARTIAL WARM BATHS are much employed, where the desire is to affect particular portions of the cutaneous surface, and through them, the whole system, or organs in the vicinity of those to which they are applied. Thus, the warm HIP-BATH is employed, particularly in inflammatory and other affections of the abdominal and pelvic viscera; and the warm FOOT-BATH, in colds, and with the view of restoring the menstrual secretion when arrested. The influence of the warmth is soon extended to other parts of the system, and diaphoresis frequently results—especially if it be favored by the warmth of the bed, and the use of warm diluent drinks. When the object is to exert a revellent influence in these cases, the temperature of the water is elevated, and salt and mustard are at times mixed with it. The ARM-BATH and HAND-BATH are rarely used except as mere topical agents.

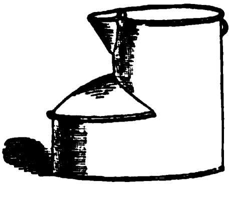
Fig. 83.



Hip-Bath.

In the use of the warm bath, there is rarely any SHOCK experienced;—in other words, no powerful impression is made by it on the nervous system; hence, no apprehension need be entertained of its producing injurious consequences except in highly impressible persons. In such, or where there is a tendency to encephalic affections, the temperature must be carefully regulated so that it be not too excitant. Both the general and topical bath are likewise considered to be unadvisable in pregnancy, and whilst the catamenia are flowing; but the injurious effects, in such cases, have doubtless been exaggerated.

Fig. 84.



Foot-Bath.

The time, during which the individual should remain in the bath, must be determined by the nature of the case. In acute diseases, a few minutes may be sufficient; but where it is desirable to relax either the skin, as in cutaneous diseases, or the powers of the system, the patient may continue in it for a considerable time. Where the affection is chronic, the bath may be taken two or three hours after a meal, so that digestion may not be interfered with. When the patient leaves the bath, friction with warm flannels may be used in chronic cases. In acute cases, he may be removed from it, and be placed in blankets.

WARM FOMENTATIONS and POULTICES act as topical baths, by virtue of their warmth and moisture. They relax the parts with which they come in contact, and, as in the case of pediluvia, the soothing topical influence they exert is extended elsewhere,—so that a sedative effect may be produced on the system generally, and on the vessels that may be affected with any internal hyperæmia especially.

INJECTIONS OF WARM WATER thrown into the rectum or vagina, in cases of disease of the uterus, peritoneum, or the upper portions of the intestines, act in the same manner as warm fomentations.

Perhaps there is no better mode of exciting diaphoresis where mischief is not apprehended from the nervous impression made on its first application, than

d. THE WET SHEET,

As employed by the hydropathist, whose system of medication is referred to in another part of this work. The Leintuch or sheet wetted in cold water is wrapped round the body, which is then enveloped in blankets, and the patient kept in this condition until copious diaphoresis occurs. It is a powerful revellent agency, and may be employed to break in upon morbid catenations. In this way, in the opinion of the author, it acts in the various neuropathic diseases in which it has been serviceable. In chronic gout and rheumatism, the good effects have by some been ascribed to the profuse diaphoresis occasioning an evacuation of the *materies morbi* supposed to be present in the blood; but this is questionable, for, as has been before remarked, certain of the remedies that have proved most beneficial in those diseases have not appeared to increase the cutaneous secretion (p. 332).

e. FRICTION.

Friction of the body, with dry flannels or with the flesh-brush, excites the action of the secretory organs of the cutaneous surface, and in moderation tends to the production of diaphoresis. It is rarely, however, employed with this view, except as an adjunct to the warm bath; and even then is more used hygienically than therapeutically. Friction is frequently employed topically to modify nutrition; but its consideration in that light falls under the head of EUTROPHICS.

SECTION IV.

AGENTS THAT AFFECT PROMINENTLY THE NERVOUS SYSTEM.

I. NARCOTICS.

SYNON. *Obstupefacientia, Stupefacientia.*

Definition of Narcotics—May be used as excitants, and as sedatives—Their action elucidated by that of Opium—May act locally as well as generally—Mental narcotics—Anæsthetics—Therapeutical application of narcotics—In febrile diseases—In the phlegmasiæ, &c.—Special narcotics.

NARCOTICS greatly resemble, in their action—when administered in appropriate doses—the class of sedatives. They differ from them, however, in several respects. Whilst the action of sedatives is not preceded by any degree of excitation, that of narcotics is. In minute doses, again, narcotics may produce none of the effects that characterize them when given in large doses. Their agency may be altogether excitant; and, with the view of obtaining the modification in the organic actions, which such agency is capable of exerting, they are occasionally exhibited in small quantity.

When given to the extent of inducing their peculiar action, they may be defined—"agents, which first excite and then diminish nervous action, and, in appropriate doses, stupefy." The power of stupefying must be esteemed one of their main characteristics.

Although the above definition may apply generally to their operation, when administered in a dose proper to produce a narcotic influence, it is obvious, from what has been said, that it is not wholly applicable, when they are given as mere excitants: in such case, they may not "diminish nervous action, and stupefy." They can then be regarded as excitants only; but, in adequate doses, the latter part of the definition is appropriate; and the effects mentioned must be regarded as the most essential consequents on their employment. Even when they are administered in a full dose, some degree of excitation is first perceptible; the functions of circulation, innervation, and secretion become more or less modified; the pulse beats more rapidly and forcibly; the skin is hotter and drier than natural; the nervous system exhibits greater impressibility; and the mouth and fauces are dry, or their ordinary secretions are more tenacious than natural. But these evidences of excitement soon pass off—more rapidly in proportion to the size of the dose,—and a train of phenomena, indicating sedation, follows those of excitement; the respiration becomes slower; the skin moist; the pulse reduced to the natural standard, or below it; the impressibility of the nervous system is obtunded; the tongue becomes moist; and all the symptoms exhibit that a sedative and soothing agency has been exerted. Perhaps, in every case, however large the dose of the narcotic may have been, some degree of excitement might be perceived as a precursor of the sedation, were due attention paid; but the sedative effect of a very large amount of any of the narcotics supervenes so rapidly on the stimulant, that the attention of the practitioner is scarcely directed to the latter operation—especially as it is not the one for the production of which he prescribed it.

The marked difference between a stimulant and a sedative dose of the same agent can be understood from the cases, so often related in the newspapers, of persons, who, for wagers, have swallowed, at once, a large draught of some alcoholic liquor. The sedative effects of this powerful excitant—excitant, that is, in a smaller dose—are so speedily exerted, that a stop may be put to all the functions, without there being any marked symptoms of previous hurry in the organic actions.

When a narcotic is taken, the first effects occur in the nerves distributed to the lining membrane of the stomach. These are rendered less impressible, and the obtunding influence is soon extended to the great nervous centres, which are affected like the nerves with which the narcotic first comes in contact. In this manner, the function of innervation generally has its activity diminished; and, therefore—directly as well as indirectly—the gastric functions may be impaired. If the narcotic be taken before eating, and when a marked desire for food is present, the appetite may be diminished or extinguished, under the new condition of innervation. If food have been received into the stomach, chymification may, for like reasons, be retarded; and the whole of the digestive operations—chymification, chylification and defecation—may exhibit torpor. It can thus be comprehended, that the use of a narcotic may be followed by constipation; and that it may be well adapted for diarrhœa, where an indirect astringent agency appears to be indicated. The precise *modus operandi* of the narcotic may, in these cases, vary with the dose: where it is large, the whole function of innervation may be blunted; and not only the secretions, but the peristole of the intestines be diminished; whilst if the dose be smaller, the effect may be mainly exerted upon the nerves distributed to the gastric apparatus, without the rest of the nervous system materially participating. In cases of diarrhœa, opium, like every therapeutical agent, has a relative action; and the same may be said of its employment in other morbid conditions. If irritation or inflammation exist in any portion of the alimentary canal, such irritation or inflammation may be allayed by a sedative dose of a narcotic; and in this way, the pathological condition being removed, its symptom—the increased number and morbid character of the evacuations—may cease. A curious phenomenon, observed by M. Poiseuille, and confirmed by M. Bacchetti, has been referred to before (p. 94),—namely, the influence exerted by muriate of morphia when a saline solution, to which that substance has been added, is placed on one side of an animal membrane, and serum of the blood on the other. The endosmose, which previously took place from the serum to the saline solution, is considerably weakened after the addition of the muriate, and ultimately the direction of the current is reversed. "How can we"—says M. Matteucci—"make an entire abstraction of this fact in the explanation of the action of morphia, and of the preparations of opium in diarrhœa, as well as of the constipation which they produce?"

It has been a very common remark, that opium is not well adapted for cases of pneumonia, bronchitis, &c., because it "diminishes the secretions," but this appears to be a questionable method of explaining its action. The suppression of secretions is not a morbid condition. It is only the symptom of such a condition; and when we state that the indication is "*to restore the secretions*," if the expression have any meaning at all, it can only convey the idea, that the morbid condition, which occasions their suppression, must be removed. Now, we know, that the first consequence of the inflammation of a mucous membrane is a diminution of its wonted secretion; and that after the inflammation has persisted for a time, an increase of the secretion takes place; but it is no longer of a healthy character. It is a secretion accomplished by vessels laboring under inflammatory excitement.

Two opposite effects, then, on the secretory function are produced by different stages of inflammation. Yet, the indication, in both cases, must obviously be alike. It must be, to remove the morbid condition, of which these effects are symptomatic. A narcotic we know to be, in appropriate doses, a sedative;—that is, it is capable of diminishing the force of the circulation, and the energy of innervation. It is, therefore, well adapted for acting as a contra-stimulant, and thus allaying inflammatory excitement. A knowledge of its properties would suggest to us the propriety of its employment in the diseased state of mucous membrane instanced above; and experience ought to show, as it does daily, that in one of the conditions assumed—in the early period of mucous inflammation—it will restore the secretions; and, in the other, where the mucous secretions have become profuse and morbid, it will diminish them, by diminishing the inflammation that occasioned them.

It is obviously, therefore, incorrect to lay down the broad law, that "*opium diminishes the secretions*," and that its use is improper whenever the indication is to "*restore the secretions*." Such an indication ought never to be imagined. It is unmeaning, and can only have been suggested in the ignorance of true pathology; and the author is happy to find, that a modern writer on therapeutics—Dr. Spillan—expresses his entire accordance with these sentiments, as expressed in the first edition of this work. In cases of pneumonia, where the expectoration has been free, a diminution of the sputa has seemed to supervene on the administration of narcotics; but this has been owing to the agent not having been administered in a dose adapted to the morbid condition of the pulmonary organs. Where opium is given in a small dose—as is too often the case—it will as surely add to the inflammation as any other excitant; and if we add to the inflammation, we may arrest the secretion altogether, by bringing back that condition of tissue, which existed at the onset of the inflammation; but if, in this very case, a full sedative dose were administered, none of the evils might be found to follow. The sedative would allay the excited organic actions, and if the secretion were diminished—as it probably would be—it would be a salutary diminution, because arising from lessened inflammatory excitement in the lining membrane of the bronchial tubes, or in the tissues in their vicinity.

Another example may be taken, in which the secretions and excretions are facilitated by narcotics. It has been already remarked, that opium is administered in cases where there is an undue number of alvine evacuations, with the view of exerting a constipating effect. But it is no less administered where constipation is dependent upon certain morbid states. When sero-enteritis or inflammation of the peritoneal coat of the intestines exists, constipation is a common symptom; and, on the other hand, if the inflammation be seated in the mucous coat, diarrhœa is as common. Why this difference should exist is owing to the inflammatory condition of the follicles, and of the mucous membrane generally, being accompanied, after the disease has continued for a short time, by augmented secretion. It might seem, however, that as the peritoneal coat so closely invests the muscular, the latter ought to be thrown into inordinate contraction, and an increase be occasioned in the number of the evacuations from this cause. Such contraction does exist, but the requisite irritation in the lining membrane is wanting to induce diarrhœa; the contraction of the fibres has more of the character of spasm; and a derivative effect is perhaps exerted, owing to the concentration of the excited organic actions in the peritoneal coat diminishing the amount of secretion from the mucous coat: in this manner, constipation comes to be one of the phenomena of peritoneal enteritis. In such a case, opium, judiciously administered, exerts its sedative agency; diminishes the inflammatory action in the peritoneal coat, and resolves the spasm in the muscular coat; so that the causes of the constipation being removed, it ceases; and we thus have a laxative, or cathartic effect, induced by remedies, which, in other morbid conditions, are well adapted for producing opposite results.

These are cases, which exhibit the value of the possession of sound pathological and therapeutical knowledge. We discover empirically the property of the drug, and having accurately appreciated the influence it is capable of exerting, we can say, *à priori*, what will be the morbid states, in which the greatest benefit may be reaped from its employment. Accordingly, as the author has remarked in an early part of this volume, analogy has led to the employment of the invaluable agent, opium, in cases, in which some years ago it would never have been ventured upon. Some pathologists have considered it best adapted for phlegmasiæ of the peritoneum—both of the membrane proper, and its extensions over the different viscera. This was the view of the indefatigable investigator of the diseased conditions of the animal economy—Dr. Armstrong. In these phlegmasiæ, he conceived it to be *perhaps* the most efficient therapeutical agent that we possess; and, although he esteemed it best to associate it with bloodletting, and to repeat both remedies according to the urgency of the case, he was disposed to think, that if he himself were laboring under peritoneal enteritis, and were told, that he must rest his hopes upon the lancet singly, or upon opium singly, he should be disposed to select the latter.

What Dr. Armstrong said of the use of opium in these cases has been extended to similar morbid conditions in other serous tissues and elsewhere; and many advantages have accrued from its employment, in some form of preparation, in cases, in which, at one time, its use was unknown, or considered inappropriate.

In a work on Therapeutics by Dr. Chapman of Philadelphia, we have the following remark: "Concerning the operation of opium, medical sentiment continues to be divided, though the preponderance is decidedly in favor of its stimulant properties, and with such an impression it is employed." It is this belief, as well as the want of knowledge of the essential difference in the action of narcotics according to the dose, that has occasioned opium to be discarded in cases of undue vascular and nervous excitement, for the removal of which it is admirably adapted. Impressed with an unfavorable sentiment towards its use—a sentiment derived from authors and teachers—the young practitioner is apt to administer it in inflammatory affections, either in doses so small, that no sedative effect is induced; or, in his caution, he strikes the medium ground between stimulation and sedation. In the former case he witnesses, perhaps an aggravation of the excitement, and, in the latter, either no effect whatever, or one of aggravation; and he, therefore, too hastily concludes, that the use of opium is, in such cases, inappropriate and injudicious. Under these feelings, he never employs it afterwards, and yet conceives himself entitled to say, from *experience*, that opium is in no case advisable, where inflammation is present.

Such were the views strenuously inculcated when the author commenced the study of medicine; and many a practitioner of the present day, who may entertain them, will find that his impressions have been derived from others. A little experience sufficed, in the author's case, to induce him to throw off the trammels of authority, and the judicious remarks of Dr. Armstrong confirmed him in his course. Both in public and in private practice, he has administered it largely; and, from the results, he is prepared to say, that we have not in phlegmasiæ in general a more valuable agent, if we except the lancet; and there are obscure cases of inflammatory action—in puerperal females especially—where it can be advantageously employed when the lancet cannot. It has, indeed, been argued, that where such affections have been relieved by opium, the very fact shows, that they were not inflammatory; and farther, that we may often mistake neuralgic diseases for inflammatory, as is sufficiently shown by the circumstance, that narcotics completely remove affections which were previously supposed to be inflammatory. The result in no respect invalidates the diagnosis. Opium is a precious sedative, and it is, therefore, as well adapted for the one class of cases as the other.

A slight reflection on the mode in which opium relieves pain will place this subject in a striking light. It will show how a narcotic may prevent the aggravation of diseased action. If we apply opium to a part of the dermoid surface whose organic actions are morbidly modified, the effect of the narcotic is exerted on the nervous ramifications themselves; their impressibility is diminished; and the irritation under which they have been laboring is no longer appreciated by the brain. In the same manner if the narcotic be swallowed, its effects are exerted upon the nerves of the stomach, and, through them, on every part of the nervous system. The brain no longer appreciates the irritation, or does so in a diminished degree. The irradiations, which would otherwise have been reflected to every part of the economy, consequently cease; and, by the simple arrest of morbid sympathies, the amount of disorder is diminished. In like manner, the induction of sleep by a full dose of opium will, at times, allay tumultuous action of the nervous and vascular systems, which could not have persisted without adding to the amount of mischief.

In colica pictonum we have a state of the alimentary tube, in which opium may be usefully employed, with the view of removing constipation. This disease is partly dependent upon irregular action of the nerves distributed to the muscular fibres of the intestines,—a state, which a combination of opium with some cathartic—as with mild chloride of mercury—is well calculated to remove. The opium allays the inordinate action of the nerves,—resolves the spasm,—and permits the mild chloride to exert its ordinary cathartic action. For reasons like these, strengthened by the results of experience, a combination of calomel with opium, or with sulphate, acetate, or muriate of morphia, is a common prescription with many practitioners in enteric inflammation. In most of the London hospitals, it may be regarded as an officinal formula.

It has been an interesting topic of inquiry,—how narcotics exert their constitutional effects;—that is, whether by the impression they make on the nerves of the part with which they come in contact—such impression being conveyed to the rest of the nervous system—or, whether they must not, in every case, enter the bloodvessels, affect the nerves distributed to the inner coat of the vessels, or pass with the current of the circulation to the great nervous centres. There are facts which may be adduced in favor of each of these views. As regards the first, one of the strongest arguments is the rapidity with which the effects of certain narcotics are induced. Of these, perhaps the most marked is an agent, which the author has classed amongst sedatives, but which has been placed, by many toxicologists, amongst narcotics,—hydrocyanic acid. The effects of this acid have been examined by numerous observers. M. Magendie asserts, that if a single drop be put into the throat of a dog, the animal makes two or three deep, hurried respirations, and instantly drops down dead; that it causes death almost as instantaneously when dropped under the eyelid; and that, when it is injected into the jugular vein, the animal falls dead at the very instant, as if struck with a cannon-ball, or with lightning. "In repeating these experiments," says Dr. Christison, "in order to determine, figuratively, the shortest period, which elapses before the poison begins to operate, as well as the shortest time in which it proves fatal, I found that a single drop, weighing scarcely a third of a grain, dropped into the mouth of a rabbit, killed it in 83 seconds, and began to act in 63 seconds—that three drops, weighing four-fifths of a grain, in like manner killed a strong cat in thirty seconds, and began to act in ten,—that another was affected by the same dose in five, and died in forty seconds,—that four drops, weighing a grain and a fifth, did not affect a rabbit for twenty seconds, but killed it in ten seconds more,—and that twenty-five grains, corresponding with an ounce and a half of medicinal acid, began to act on a rabbit as soon as it was poured into its mouth, and killed it outright at ten seconds at farthest. Three drops projected into the eye, acted on a cat in twenty seconds, and killed it in twenty more; and the same quantity on a fresh wound in the loins, acted in forty-five, and proved fatal in a hundred and five seconds."

In the case of hydrocyanic acid especially, it has seemed to be difficult to offer any other explanation, than that its effects are exerted upon the nervous radicles with which it is made to come in contact; and that thence, with the rapidity of lightning, the lethiferous influence is propagated to the nervous centres, which die first, and in due succession, all the functions under their presidency cease. Dr. Christison, indeed, when treating of opium, affirms, that "the old doctrine, that the bloodvessels have no concern with its action, and that it acts only by the conveyance along the nerves of a peculiar local torpor, arising from its direct application to their sentient extremities, has been long abandoned by most physiologists as untenable. But some have adopted a modification of this doctrine, by supposing that opium may act both by being carried with the blood to the brain, and by the transmission of the local torpor along the nerves. They believe, in fact, that opium possesses a double mode of action, through sympathy, as well as through absorption." "It would be fruitless," he adds, "to inquire into the grounds that exist for adopting or rejecting this doctrine, because sufficient facts are still wanting to decide the controversy. So far as they go, however, they appear adverse to the supposition of a conveyance of impressions along the nerves, without the previous entrance of the poison within the bloodvessels."

All the difficulties in the way of the theory of the sympathetic action of opium—Dr. Christison thinks—are removed by the doctrine of Messrs. Morgan and Addison. According to this, the experiments, which appear at first sight to prove, that opium operates by being carried with the blood to the part on which it acts, are easily explained by considering, that the opium makes a peculiar impression on the inside of the vessels, which impression subsequently passes along the nerves to the brain. In the case of hydrocyanic acid, the imbibition must take place most rapidly, as the deadly results supervene so soon after its application. Its penetrating power must exceed that of other toxical agents, many of which require a long time before their effects are perceptible. At one time, the author was disposed to believe, that its action could only be accounted for, by presuming that its impression is made on the nerves, either of the part, or of the interior of the bloodvessels; there did not appear to be time for the poison to pass to the nervous centres with the circulatory current, and the experiment of M. Magendie—which showed that death supervened on the very instant when the acid was injected into the bloodvessels, whilst a few seconds elapsed before its fatal action was exerted, when it was put in contact with an absorbing surface—seemed to favor the notion of Messrs. Morgan and Addison, that the impression might be made on the nerves distributed to the inner coat of the bloodvessels; although the difficulty remained, why these nervous filaments should be more impressible to poisons than the nervous radicles distributed to the external dermoid or other tissues. The experiments, previously referred to, of Hering in Germany, of Dr. Blake, formerly of Saint Louis, and others, on the almost inconceivable velocity with which substances pass from one part of the circulatory system to another,—along with those of Dr. Blake, Dr. Christison, and others, on the poisonous effects of hydrocyanic acid, which showed that there is always an appreciable interval—notwithstanding the assertions of M. Magendie to the contrary—between the reception of the poison into the blood, and the manifestation of its poisonous influence, remove—as before remarked—many of the difficulties in the way of the belief, that all poisons may act on the vital organs for which they have a special affinity; and may require to pass with the circulating fluid to those organs before their toxical influence is manifested.

It is proper to bear in mind, in this investigation, that many agents of the class under consideration produce impressions on the nerves of the part to which they are applied, without the general system being materially, if at all, implicated;—a circumstance, which favors the view that poisons must enter the bloodvessels, in order that they may act on the general system. M. Robiquet remarked, that when the vapor of concentrated hydrocyanic acid was confined for some time in a glass tube, with a finger on each open end, the point of the finger became benumbed, and remained so for more than a day. Dr. Wilson Philip found that when opium was applied to the mucous coat of the intestines of a living rabbit, the muscular contractions of the gut were immediately paralyzed, without the general system being affected for some time. The same result was observed by Messrs. Morgan and Addison to follow the application of ticunas to the intestines. An instantaneous and total suspension of the peristole took place whenever the poison touched the gut. Dr. Monro, secundus, found, when an infusion of opium was inserted between the skin and muscles of the leg of a frog, that the leg soon became paralyzed, whilst the animal was able to leap about briskly on the other three.

Many similar examples of purely local impression might be instanced, were it necessary. The singularity is, that the general system should, in these cases, remain intact. A striking case of purely local action, and, at the same time, of that inexplicable preference in the influence exerted by various agents on the economy, of which we have so many examples, is the effect of some of the class of narcotics in dilating the pupil. This is done by the extracts of belladonna and stramonium, without the general nervous system being in the least implicated; whilst the most energetic of the narcotics—opium—exhibits no such preference of action on those nerves.

If it be admitted, then, that narcotics may affect the frame through the medium of the nerves, without its being necessary, that they should proceed with the blood to the great centres of the nervous system, there are strong facts to show, that, in certain cases, they are absorbed, and act through the medium of the circulation. Still, as has been suggested by Dr. A. T. Thomson, such absorption would seem to be by no means essential. The strongest arguments in favor of it—as properly stated by him are; *First.* The time that supervenes between taking a dose of opium and the manifestation of its influence on the system—a time sufficient, certainly, for the absorption of the narcotic; but in reply to this argument he states, that the intimate combination of the meconate of morphia with the other constituents of the drug requires some time before it can be so far separated as to be able to act with energy on the sentient extremities of the nerves of the stomach; for "we find," he adds, "that the time which supervenes, is in the direct ratio of the state of solution and separation from the other constituents of the opium, in which the meconate exists in the preparation employed."

But this explanation is unsatisfactory. When taken in a soft pill, opium produces its effects almost as soon as when any of its preparations are administered. It has, indeed, been maintained, that this is not the fact, but the very cases adduced are such as establish the affirmative of the position. In a case, related by M. Desruelles, the sopor was fairly formed in fifteen minutes, after two drachms of solid opium had been taken. *Secondly.* The increase of the symptoms for ten or twelve hours after their inception, although the opium is as much in contact with the nerves in the first quarter of an hour as at the end of the twelve hours. This argument—Dr. Thomson observes—is more difficult to answer than the first; and his opinion is, that it certainly indicates absorption. This is probable; but, under any view, it is somewhat strange, that the augmentation should continue so long; and the supporters of the doctrine, which holds, that the effect must take place through the medium of the nerves, might suggest, with much speciousness, that such effect is as easily explicable, on the idea of the repetition of narcotic impressions made by fresh and fresh portions of the narcotic coming in contact with the nerves distributed to the inner coat of the bloodvessels, as by the view, that the narcotic must pass, with the blood, to the nervous centres themselves. *Thirdly.* The rapid effects, which follow the injection of opium in solution into the veins; and not opium only, but any of the narcotics. Orfila found, that an ounce of the extract of the leaves of conium killed a dog in forty-five minutes. Ninety grains, inserted into a wound, killed another dog in an hour and a half; and twenty-eight grains, injected into a vein, killed one in two minutes. It is, therefore, legitimately inferred, that these substances act by entering the bloodvessels. There are numerous facts, indeed, which show incontrovertibly, that opium may enter the fluid of the circulation. During the confinement of the wife of a friend of the author, it was considered necessary to administer morphia to her: the infant became so completely narcotized, that serious apprehensions were entertained for its safety. It ultimately recovered. A similar case is given by M. Barbier, in which the infant was manifestly affected through the milk of the mother, who had taken a large dose of the wine of opium. In these instances, the narcotic must have passed into the circulation of the mother, and been separated by the mammæ.

From all the facts, then, it would seem, that narcotics may exert their effects upon the nerves of a part, and perhaps on those distributed to the inner coats of the bloodvessels; but, that to affect the system generally, they must pass into the current of the circulation, and proceed with it, to exert what precise agency is not clear.

Dr. A. T. Thomson has affirmed, that the nerves more particularly affected by narcotics and sedatives are the respiratory; but it is not easy to see how he arrives at this conclusion. He quotes, in confirmation of the opinion, a series of experiments conducted by Sir Benjamin Brodie, who introduced, in one instance, a drop of volatile oil of bitter almonds into a wound in a rabbit: after five minutes, respiration had ceased; but the heart "was still beating through the ribs;" and, by renewing and keeping up respiration by artificial means for sixteen minutes, spontaneous breathing was re-established; all the functions of the brain were revived, and life was restored. Dr. Thomson adds:—"It is not easy to explain, why one set of nerves should be more particularly influenced than another by narcotics." This case does not, however, appear to be in point. There is a marked difference between the voluntary, the excito-motory, and the organic nervous systems. The voluntary muscles are under the presidency of the first:—the involuntary, under that of the second; the respiratory organs are supplied by encephalic nerves, as well as by the true spinal or excito-motory, and by ganglionic nerves; but the heart is singularly situate as regards its nerves. Although capable of being affected through them, its action may continue after the great nervous centres have been destroyed. When, however, the cerebro-spinal axis is destroyed, the mechanical phenomena of respiration necessarily cease.

In like manner, if the functions of the brain and spinal system be suspended by the action of a powerful narcotic, the respiratory phenomena, which are dependent upon the influence of the latter, are suspended also; and if the action of the narcotic be fleeting, we may conceive, that, by keeping up the mechanical phenomena of respiration, and thus maintaining the heart in action, as the influence of the narcotic passes away, the nervous centres may resume their wonted functions, and respiration be completely re-established. An interesting case of the kind has been recorded by Dr. Casper Morris, of Philadelphia.

The experiments of Sir Benjamin Brodie and others, ought, therefore, to be borne in mind; and although in the case of narcotics, whose action is prolonged, no useful hint may be derived from them of a therapeutical nature, yet, as has been said before, where a narcotic has been taken, whose action is transitory, the recollection of them, and a due acquaintance with the physiological inferences deducible from them, *may* lead to the preservation of life, which, otherwise, might have been lost.

Narcotics, then, may be used as excitants, or as sedatives. Generally, they are employed to diminish impressibility, and to allay excitement; and a knowledge of their medicinal properties enables us to administer them even when high inflammatory action may be present. The case of severe headache supervening on great loss of blood from the uterus was selected before (p. 52), with the view of pointing out the difference that may exist between hyperæmiæ of various kinds. It was then remarked, that a few hours after blood has been lost to an inordinate extent by this, as well as by any other form of hemorrhage, the nervous impressibility may be irregularly developed; and, under the erethism of the nerves distributed to particular bloodvessels, these vessels may assume augmented action, and evidences present themselves in the circulatory movement, which appear to indicate the existence of vascular force and repletion; and that, in all such morbid conditions, the indication cannot be—to draw more blood from a system already exhausted as far as is compatible with the persistence of life. On the contrary, it must clearly consist in allaying the irritability of the nervous system, which has been so inordinately developed; and the best mode to accomplish this is to administer a full sedative dose of opium, under the action of which the nervous and vascular turmoil rapidly subsides into a state of quietude.

In some experiments on dogs instituted by MM. Aug. Duméril, Demarquay, and Lecointe, in order to appreciate the effect of different therapeutical agents on the function of calorification, trials were made with the laudanum of Rousseau, the acetate of morphia, and codeia. Nine experiments were performed with these substances, either administered by the stomach, or introduced into the veins, and the final result was, in all cases, a considerable depression of temperature, which, at times, supervened with great rapidity. Trials were also made with articles of the family Solanaceæ—as belladonna, datura stramonium, and hyoscyamus, and the results were, on the whole, of a similar character, but to a less extent. An exception to this appeared to present itself in the case of hyoscyamus, whose ultimate effects seem to be, to excite a little the function of calorification; but only two experiments were made with it.

It is astonishing to what an extent narcotics may be borne with impunity, where a habit of resistance has been acquired by long-protracted indulgence. Dr. Russel, in his 'History of Aleppo,' states, that a Turk of the name of Mustapha Shatar—an opium-eater in Smyrna—took daily three drachms or 180 grains of opium; and the author of the 'Confessions of an English Opium-Eater,' is affirmed to have consumed, at one time, eight thousand drops of laudanum daily. If we consider, that 25 drops of laudanum are equal to one grain of opium, this would make 320 grains, or upwards of five drachms, in the day. But the poet Coleridge far exceeded this. Mr. Cottle states, that, from information given him from an undoubted source, Mr. Coleridge "had been long, very long, in the habit of taking from two quarts of laudanum a week to a pint a day; and on one occasion he had been known to take in the twenty-four hours, a whole quart of laudanum." This—as Mr. Cottle remarks—exceeds the quantity which Psalmanazar ever took, or any of the race of opium consumers on record, being equivalent to upwards of ten drachms of opium. MM. Trousseau and Reveil record the case of a man at the Hospital Necker, who took 25 grammes or about 6½ drachms of opium in the day. In a case of cancer of the uterus, treated by Drs. Monges and La Roche of Philadelphia, the quantity of laudanum was gradually increased to three pints in the twenty-four hours, and the patient took besides a considerable quantity of solid opium.

Besides the physical agents classed under the head of narcotics, there are certain moral influences, which may be placed in the same division. These have been termed 'MENTAL NARCOTICS;' and it has been properly remarked by Dr. A. T. Thomson, that "persons who are endowed with great nervous sensibility, are for the most part powerfully affected by mental pleasures and pains; and, therefore, when the higher orders of society and men of intellectual acquirements are affected by mental diseases, it is sometimes necessary to employ mental narcotics, when material substances fail in procuring repose." Perhaps, however, in all cases, such mental operations are wholly of a revellent kind; and sleep ensues, owing to the mind being diverted from trains of thought, or impressions, which prevented it. Impressions upon the nerves of audition have a more soothing effect than those on the other senses. It is thus, that music exerts so powerful an effect on the frame—partly, perhaps, by the mere excitation of the auditory nerves; and partly, also, by the abstraction, which it induces, when selected so as to be adapted to the precise feeling. Its influence on the hearer has been beautifully depicted by Dryden, in his 'Alexander's Feast;' and, that the picture is not overdrawn, must be admitted by all, who have heard the piece well read, with the "action suited to the word;" and, indeed, on simple perusal, by every one, whose mind is attuned to the livelier sympathies.

If the musical air be cheerful, and varied, the attention may be kept on the alert, so that sleep is dispelled; but if its character be "most musical, most melancholy," and, withal, more or less monotonous, sleep is almost sure to ensue. The poet Armstrong—himself one of the profession—has well described the effects of music when he says:

> "Music exalts each joy, allays each grief,
> Expels diseases, softens every pain."

It can readily be conceived, that in many cases of insanity appropriate music may exert a valuable therapeutical agency, but it requires the greatest caution on the part of the practitioner to adapt it to particular cases. Lively music may abstract the melancholic from his corroding dejection; and the more soothing has been known to produce the happiest effects on the furious maniac. To adapt it properly, it is important to know something of the history of the patient, lest associations of a painful character should be called up, which might vibrate to every part of the frame, and give rise to an increase of the aberration.

But it is not necessary, that the intellectual pleasures of music should be always experienced, when the object is to restore sleep to the sufferer, or to one who is in health. Any succession of unvaried sounds can induce it; as the bubbling of a brook; the purling of a rill; the hum of a distant busy multitude; a discourse—however interesting—delivered in a drawling monotonous manner; the clacking of a mill, &c. In like manner, the ballad of the nurse, with the rocking of the cradle, soothes the restless infant; and with the same view, the nurse scratches its back, and the older individual is recommended to count, over and over again, as far as fifty;—and the expedient often succeeds. The mind is abstracted from the thoughts and reflections that occupy it, and the monotony of the occupation combines to accomplish the desired result. The passes and other manipulations of the animal magnetiser induce a like effect, along with a series of singular and anomalous phenomena, implicating materially the sense of feeling;—deadening, for example, pain, whilst other sources of irritation may be vividly appreciated. Operations have, indeed, been practised—the extraction of a tooth, as the author has witnessed,—and even major operations, apparently without any disagreeable sensation having been experienced, when an impressible patient had been thrown into that anomalous hysteroid condition, which is commonly termed *magnetic* or *mesmeric*.

Not less singular and far more satisfactory results have been obtained from the extensive employment, of late years, of agents, which have been termed ANÆSTHET'ICS; and which fall as appropriately under consideration in this as in any other place. Dr. Pereira, indeed, in the third edition of his work (1849) makes a sub-order *Anæsthetica* to the order *Æsthetica*, "agents affecting sensation," which he regards as synonymous with narcotics, anodynes, and paregorics; and defines, "agents which diminish sensibility or relieve pain;"—adding, that the term anæsthetica is commonly applied to agents which diminish common sensibility, or sensibility to pain. It has been of late, however, generally employed to designate such agents when received into the lungs in the form of vapors or gases; and the vapors most used are those of ether and chloroform; which pass into the blood along with the air of inspiration, and proceed to the nervous centres, on which their action is exerted. Perhaps, as a general rule, the intellectual functions first feel the influence, through the excitant action of the anæsthetic on the cerebral and cerebellar ganglia; so that a sort of intoxication supervenes, with imperfect power of regulating the movements: the sensory ganglia become afterwards, or simultaneously affected, and sensation and motion are suspended; and ultimately, if the quantity inhaled be sufficient, the medulla oblongata has its action suspended or destroyed; respiration ceases, and death is the consequence.

Yet great irregularity occurs here as well as in the hysteroid condition of animal magnetism; for at times the intellect appears to be but little affected, whilst sensation is obtunded; and at others morbid sensation or pain is blunted whilst ordinary feeling persists. Caution is, of course, required in the administration of anæsthetics, in order that a sufficient quantity of air may pass into the lungs along with the vapor to prevent asphyxia; and that so great an amount of the anæsthetic may not be administered as to endanger a poisonous impression on the nervous centres. Fatal results have occasionally supervened, but they have been rare; and except in extraordinary cases might, perhaps, have been avoided; and now—that proper discrimination is made as regards the cases that are adapted for anæsthetics, and due precautions are employed in their administration, it is less usual to hear of unpleasant consequences, although both ether and chloroform are extensively employed by the surgeon, the obstetrician, and the dentist. On the parturient female, they appear to have the effect of diminishing pain, whilst they do not interfere with the expulsory action of the uterus.

The supervention of *anæsthetization*—as it has been termed—is known by closure of the eyelids, if they have previously been open; failure to respond to questions, and muscular relaxation. It is requisite to examine carefully the pulse and the respiration. If they fail, or if the pupil, after having been contracted becomes dilated, the inhalation must be discontinued, and the patient's face be sponged with cold water; and the stimulus of ammonia be applied to the nostrils and throat; with frictions to the extremities.

The local application of anæsthetics, as of narcotics in general, deadens the sensibility and power of motion of a part, whilst the nervous centres, and the nerves distributed to other parts of the body, may be unaffected. Mr. Nunneley instituted an extensive series of experiments on animals, and found that by immersing a limb in a small quantity of the fluid, or by applying the vapor topically for a limited period, it might be rendered perfectly motionless and senseless; and be fixed in any desired position.

Pressure on both carotids has, also, been employed as a means of inducing sleep and anæsthesia; and it is strongly recommended by Dr. Fleming as a remedial agent in certain headaches, tetanus, asthma, and other spasmodic diseases, and to prevent pain in small operations, as the extraction of a tooth, or the opening of an abscess.

As a local anæsthetic, congelation, by means of a freezing mixture of ice and salt, applied in a small net or bag, has been used with advantage in some of the lesser operations of surgery.

Therapeutical Application of Narcotics.

The inquiry, already entered into respecting the properties of narcotics as medicinal agents, renders it unnecessary to say much concerning their therapeutical application. Allaying pain, producing sleep, and diminishing action in large doses, it is only in such doses that their use can be proper, where there is augmented vital activity.

On the other hand, as they are excitant in small doses, they must be exhibited in such doses, where the object of the physician is to add to the amount of excitation.

Intermittents.—In intermittent fevers, narcotics are occasionally administered to stop an anticipated paroxysm: this effect is probably induced by the new action they occasion in the nervous system, which breaks in upon the morbid chain that exists in these periodical affections.

Continued and *remittent fevers.*—In continued and remittent fevers, when narcotics are considered to be indicated by extreme watchfulness and restlessness at an early period of those diseases, narcotics should obviously be given in such quantities, that their sedative influence may be fully exerted; otherwise, the exaltation of the vital manifestations may be augmented by them. The author well recollects, at the period when he followed the clinical lectures of the late Dr. Home, at the Royal Infirmary of Edinburgh, but little hesitation existed, as regarded the administration of opium after the ninth day of a continued fever; not because the intelligent Professor conceived, that there was philosophy in the observance of days; but because it had appeared to him that prior to this period—that is, during the first week of the disease—the beneficial effects of the opiate were not as marked as they were afterwards. The ordinary dose, directed by Dr. Home, was thirty-five drops of *tinctura opii.* Pursuing the plan inculcated by him, the author was in the habit—early in practice—of waiting until about the commencement of the second week, and then of prescribing this quantity; but as he became better acquainted, from experience, with the properties of the drug, and with the pathological conditions present in fever, he did not hesitate—in public and in private practice—to give it in larger doses, and even at an early period of the disease; and he is not prepared to say, that he has, in a solitary instance, observed unpleasant results from its administration. He generally begins with 40 or 50 drops, in the case of the adult, or with 15 or 20 drops of the black drop, or with one of the preparations of morphia; and is careless as to the precise period of the complaint, provided symptoms exist, which appear to him to indicate its use.

Inflammation, spasmodic diseases, &c.—Of the employment of narcotics in the different phlegmasiæ, the author has already treated at so much length, that it is not necessary to add anything farther here. In the spasmi of Cullen, and in some of the vesaniæ, they are, at times, the only agents that afford the slightest relief; and it is astonishing what quantities may be taken without the supervention of narcosis. The vaporous anæsthetics are here often of essential service. In all such cases, they act as indirect agents belonging to the class of "antispasmodics." In delirium tremens, opiates are trusted to solely by some; but they are rarely, or never, indispensable,—the disease generally yielding to an expectant mode of management. It would be endless to attempt to point out every pathical state, in which the use of narcotics may be indicated. The practitioner must judge for himself; and if he understands the nature of the morbid phenomena, and is well acquainted with the medicinal properties of his narcotic, he cannot fail to know when its employment would be salutary or noxious. The object of this work is to attempt to lay down great general principles of therapeutics, and to avoid detail. Of the evils of too great detail, we have, indeed, examples in some of the existing works on Therapeutics and Materia Medica, from the perusal of which it is impossible for the student to rise with other feelings than those of confusion.

SPECIAL NARCOTICS.

1. O'PIUM.

Opium is the concrete juice of the unripe capsules of *papaver somniferum.* The process for procuring it is much the same in all countries. It consists in making incisions into the capsules; and collecting the juice that exudes. Its name—from οπος, "juice"—sufficiently indicates its nature. The poppy is cultivated in various countries, but especially in Asia Minor, Hindostan, and Egypt; and opium is collected, although not to much extent, in Europe. In fact, the price at which Turkey opium can be imported renders the domestic cultivation an unprofitable speculation.

The principal varieties of opium, met with in commerce, are the *Turkey*, the *Egyptian*, the *East Indian*, the *Persian*, and the *European.*

1. **TURKEY OR LEVANT OPIUM** is raised in Anatolia, and is annually exported from Smyrna to the extent of about 400,000 lbs.; hence it has been called *Smyrna opium.* It is produced at several places, from ten to thirty days' distance in the interior; but that grown at Caisar, about 600 miles from Smyrna, is said to be most esteemed. It comes to the United States either directly from the Levant, or indirectly through some of the ports of the Mediterranean. This variety of opium is said to be beyond comparison the most abundant in our market, and it is that from which the ordinary descriptions of opium are drawn. It occurs in irregularly rounded or flattened masses, varying in size, but rarely exceeding two pounds in weight, usually surrounded with reddish capsules and leaves of some species of rumex. When first imported, it is soft, and of a reddish-brown color; but becomes hard and blackish by keeping. Dr. Wood, of Philadelphia, states that the color of the finer parcels of Smyrna opium is light brown; of the inferior, darker. When cut into, it has a waxy lustre; and when torn, minute shining tears are observable, seeming to show, that the masses are made up of agglutinated tears. Although this variety would appear to be the purest met with, it is frequently largely adulterated. Dr. Pereira states, that from one sample, weighing ten ounces, he obtained ten drachms of stone and gravel. The average quantity of morphia that can be obtained from it has been estimated by him at about 8 per cent. Dr. Wood affirms that good Smyrna opium ought to yield 10 or 11 per cent.

A variety is imported from Turkey, which has been termed CON-

STANTINOPLE OPIUM. Of this there would seem to be two sorts,—the one in very large irregular cakes, which is of very good quality; and the other in small flattened regular cakes, from two to two and a half inches in diameter, covered with poppy leaf. It has a more feeble odor, and blackens in the air. The cakes are never covered with the rumex like the Smyrna opium.

Constantinople opium is much inferior to Smyrna opium, but superior to the Egyptian. M. Guibourt states, that it does not yield more than half the quantity of morphia obtainable from Smyrna opium; yet there is great discrepancy in the statements on this head,—sufficient, indeed, to lead to the belief, that different kinds of opium are taken to Constantinople, and exported from thence, so as to be called Constantinople opium.

2. **EGYPTIAN OPIUM** is only of recent introduction into commerce, and is understood to be one of the products of the agricultural speculations of the late Pacha of Egypt. (Christison.) It is imported in round flat cakes, weighing from four to eight ounces, and wrapped up in some leaf. It is hard and dry; of a pale brown color, and waxy lustre. According to M. Guibourt, it affords only five-sevenths of the morphia obtainable from Smyrna opium. By another experimenter, Merck, from 6 to 7 per cent. was obtained from it, and it yielded much meconic acid. Another specimen, examined by Mr. J. Evans, of Philadelphia, afforded only 3·55 per cent. It is evidently, therefore, inferior to the varieties of opium already considered; yet some of it would appear to be excellent. A specimen taken from a large quantity, that was purchased for Constantinople opium, yielded Dr. Christison rather more muriate of morphia than average opium from Smyrna. It would appear, according to him, to have been pretty largely imported into Great Britain for some years past, and to have been freely purchased at a price from ten to twenty-five per cent. under that of fine Smyrna opium; although, for the most part, more inferior than in proportion to the difference of price.

3. **INDIAN OR EAST INDIAN OPIUM.** Three varieties of East Indian opium are known in commerce,—The *Malwa*, the *Benares*, and the *Patna*. The two last would, however, appear to be undistinguishable; and, accordingly, they are considered, by most pharmacologists, under the name of *Bengal opium*. Little of the East India opium reaches the United States.

Bengal opium is met with in balls, each weighing about three pounds and a half; packed in chests, each containing about forty balls, which are hard, and consist of a case about half an inch thick, and half a pound in weight, formed of tobacco leaves and agglutinated poppy petals, and filled with a black pitch-like mass, soft enough, even when some years old, to be taken out with a spatula. According to Dr. Pereira, it is the most inferior of the East Indian opiums,—not containing more than half the quantity of morphia procurable from good average Turkey opium. The Benares opium is the kind prepared by the Chinese for smoking, and its consumption would appear to be enormous. Prior to the difficulties with China, the sales there alone, according to Dr. Christison, had rapidly risen to the amount of three millions of pounds avoirdupois, worth about as many pounds sterling. A variety of Bengal opium, called GARDEN PATNA OPIUM, results from an improvement in the mode of preparing it. Dr. Christison states, that he has examined specimens, which were little inferior to average Turkey opium in the quantity of morphia they contained. This variety is not, however, known in commerce.

Malwa opium has usually been regarded as an inferior kind of East India opium, but it is said to have risen greatly in value, and to be now highly esteemed. Dr. Pereira describes two varieties: the one in round flattened cakes or balls, weighing ten ounces; packed in a coarse kind of chest, composed of broken poppy petals; of a dark brown color, homogeneous texture when cut into, and of an odor similar to that of Smyrna opium; the other in flattened cakes without any outer covering; dull, opaque, of a blackish-brown color externally, and somewhat darker and soft within; having an odor something like that of Smyrna opium, but less powerful, and combined with a slight smoky smell. According to M. Guibourt, it furnishes not more than one-third of the morphia obtainable from Smyrna opium.

Under East India opium, Dr. Pereira describes two other varieties, —the *Cutch opium* and the *Kandeish opium*, but they are of little interest, as they are not found in commerce.

4. PERSIAN OPIUM, also called *Trebizon opium*, in consequence of its being imported into Europe from Trebizon on the Black Sea, is in the form of cylindrical sticks, become somewhat angular by pressure; of about six inches in length, and half an inch—more or less —in diameter; enveloped in a smooth shining paper, and tied with cotton. It is soft and flexible; and does not become hard even when kept for years. It is of a paler brown color than any other kind; and of a distinctly granular texture. Its taste is intensely bitter; and it is of very inferior quality. Dr. Christison states that, in 1834, he saw in the London Docks many large chests of it, which were quite unsaleable. It has been seen in this country, but not often.

5. EUROPEAN OPIUM. This name is given to opium which has been made in Great Britain, France, Germany, and Greece. It can never become an article of commerce, in consequence of the low price at which foreign opium can be imported. Some, that was raised by Dr. Young of Edinburgh, closely resembled in its characters the Egyptian, or the Malwa opium, excepting that it was in roundish masses. It was hard, dry, pulverizable, of a light brown color, shining and perfectly homogeneous, and brought a better price in the market than fine Turkey opium. Some, prepared by Messrs. Cowley and Staines, yielded 7·57 per cent. of morphia. Another specimen of British opium yielded, however, only 4·4 per cent.

The opium made in France is described by M. Pelletier as of a deep reddish-brown color, and brittle when dry; yielding in some specimens a considerable percentage of morphia,—according to M. Pelletier 10·38 per cent. German opium, prepared from the purple poppy, *Papaver somniferum*—variety *nigrum*, yielded likewise a large per centage:—according to Biltz, as much as 20 per cent. It is doubtful, however, whether these estimates can be used comparatively, as we have no evidence that the morphia in all the cases was equally pure.

The physical properties of opium are generally taken from the Smyrna opium. There are certain qualities, which belong, however, more or less to all. The odor is strong, peculiar, and characteristic in all the varieties, but in some more so than in others. The taste is very bitter, and somewhat pungent, exciting irritation in the lips and tongue when chewed for any length of time. The best opium does not undergo any change by keeping, excepting that it becomes harder: and this change it is important to bear in mind, inasmuch as there must be great diversity in the strength according to the degree of dryness; hence some of the Colleges have directed, that the preparations of opium shall be made from the powder. Some of the coarser kinds of Turkey opium, and the common Bengal variety in balls, are apt to become mouldy after a time; and the latter, as well as Persia opium, never seems to harden thoroughly under exposure to the air, which has been supposed to be owing to the admixture of oil with it (Christison). When thoroughly dried, it can be reduced to powder, but as it attracts moisture from the air, and becomes lumpy, the powder should be kept in well-stopped bottles.

The quantity of opium taken in various parts of the world is astonishing. Allusion has already been made to that consumed by the Chinese prior to the interdiction of its use. In England, the quantity, on which duty was paid in the year 1841, was, according to Dr. Pereira, 37,960 pounds; and in the year preceding, it was 45,589 pounds; the greater part of which was imported from Turkey. From the Treasury returns of the United States for the year 1829, it appears, that the value of opium imported from the Turkish dominions was 92,924 dollars; from Mediterranean France 12,187 dollars, and from every other part of the world 2040 dollars. None was imported from India. (Wood & Bache.) From the Treasury returns from 1827 to 1845 inclusive, the average value of the annual importation of opium during that period was, according to Dr. J. B. Biddle, from Turkey, $128,137; from England, $13,744; from France, $4470; and from all other places, $6607. Of this so much was exported as to make the value of the mean annual consumption, $66,809. From July, 1848, to April, 1849, inclusive, Dr. Bailey, inspector of drugs at the port of New York, rejected 750 lbs. of opium from Marseilles; 1743 lbs. from London, and 860 lbs. from Smyrna.

Water dissolves about two-thirds of Turkey opium, including a great proportion of its active ingredients; alcohol dissolves nearly four-fifths of its weight, and all its active constituents. Sulphuric ether dissolves little more than one of the active principles, which is not soluble in water—the narcotin, and the dilute acids, both mineral and vegetable, entirely exhaust it of its virtues. It contains a great variety of principles, and has received much attention from analytical chemists, from whose labors it results, that it has at least the following constituents:—morphia, narcotin, codeia, narcein, meconin, thebain or paramorphia[?], pseudomorphia, meconic acid, brown acid extractive, sulphuric acid, resin, fat oil, gummy matter, caoutchouc, albumen, odorous principle and lignin. The most important of these are morphia, codeia, and narcotin, of which the first is an officinal preparation, and will be described hereafter. They are all of modern discovery. Of the six crystalline principles, morphia, codeia, and paramorphia, narcotin, narcein, and meconin, the first three are alkaline, and the others neutral.

CODEÏA or CO'DEINE, the preparation of which is given by the author elsewhere (*New Remedies*, 7th edit. p. 238, Philadel. 1856), is a white crystalline solid; soluble in water, alcohol, and ether; uniting readily with acids; and, with the chlorohydric especially, forming a salt which crystallizes with great facility. 1000 parts of water, at 60° Fahrenheit, dissolve 12·6 parts: the same quantity at 100°, 37 parts, and at 212°, 58 parts.

The experience of different observers in the effects of codeia on the economy has been discordant. M. Magendie states, that it causes sleep; and, in large doses, stupor. He considers one grain of codeia equivalent to half a grain of morphia. Two grains often excited nausea and even vomiting. A *syrup*, each ounce containing two grains of codeia, has been given in hooping-cough, and in other diseases in which opium has proved useful; and it has been found serviceable by Dr. Miranda, of Havana, in cases of what he terms "powerful nervous irritations of the mucous membrane of the stomach." The muriate has been used in Philadelphia, but it has not been found to have any virtues, not equally possessed by the salts of morphia; whilst it has the objection that the price has been enormous—as much as from four dollars to two dollars and a half a drachm.

Two more alkaloids—*papaverine* and *opianine*—have been discovered in opium—the latter having the same properties as morphia when given in like doses; but neither of them has been subjected to much therapeutical examination.

NARCOTIN
NE is commonly procured either from the
by means of *ether*, which only dissolves the
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which has been exhausted by *cold water*. It
rom the residue after the preparation of the
m of the shops. It crystallizes in very white
aste and smell; neutral; insoluble in water;
oiling rectified spirit, and dilute acids. By
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rd to the medical properties of narcotin have
M. Magendie was of opinion, that morphia is
dyne principle of opium,—narcotin the exciting.
other hand, entertained various notions in regard

to it,—at one time believing it to be inert; at another, to have the same action as morphia; and at another, to concur, when combined with morphia, in the properties of opium, but to a slight degree only—since opium, deprived of narcotin, is not less deleterious—and to possess another *modus operandi* than opium, without, however, his being able to regard it as the exciting principle. Others have given it in large doses without any narcotic effect having been induced by it; and hence it has been imagined, that the narcotin of the earlier experimenters was an impure article.

Owing to all the uncertainties appertaining to it, narcotin is but little employed in medicine. It would seem, however, that the exciting properties of opium do not belong to it exclusively, for—as elsewhere remarked—there are many persons who are as disagreeably affected by morphia alone as they are by opium, which contains both morphia and narcotin. It has been employed as an antiperiodic in the treatment of remittent and intermittent fevers. (See TONICS.)

The other constituents of opium are not of much, if any, therapeutical interest. Narcein, meconin, pseudomorphia, and meconic acid appear to be inert. Thebain or paramorphia, according to M. Magendie, when injected into the jugular vein, or placed in the pleura of an animal, causes tetanus and death in a few minutes.

The therapeutical effects of opiates in different doses have been briefly referred to under the general observations on Narcotics. That they are excitant in a small dose is admitted by all; and that they are sedative in a large dose is equally admitted by most observers. A grain of opium, which is an ordinary dose, first of all excites the organic actions; but this excitement is followed, in the generality of cases, in a short time, by sedation. The animal functions are exalted along with the organic, so that sensibility and muscular motion are exerted with more vigor; but this excitation is sooner or later followed by a disinclination to movement, and a tendency to sleep. Usually, during the period of excited action, the mouth is dry and clammy, and there is thirst; the appetite is impaired,—the secretions and peristole of the intestinal canal seeming to be diminished, so that constipation ensues. Hence, in the healthy state of the frame, as well as in certain conditions of diarrhœa and dysentery, small doses of opium are often used as indirect astringents. When larger doses are administered,—from two to three grains, or more,—the excitement of the animal and organic functions may still be perceptible in the first instance; but commonly the excitement persists for a very short time, and is succeeded by a sedative influence, with a troublesome itching of the surface, and a warm, and, at times, a copious perspiration, and a state of dreaminess followed by stupor, and ultimately by an irresistible desire to sleep. When sleep is not caused by it, and a full dose has been taken, the patient is often amused—and at times annoyed—by the multitude of fantastic groups, which he can frequently call up at pleasure. In many cases, when the effects of the opiate pass away, more or less disturbance of the functions of the stomach and bowels remains, with languor and listlessness.

When given to a still greater extent, opium and its preparations are narcotic poisons; they are types, indeed, of the class. In such large doses, no signs of excitement are perceptible, the first evidences of the poisonous action being giddiness and stupor, which rapidly increase so that there is a suspension of all mental and moral manifestations,—the individual appearing to be in a deep coma; breathing slowly; the eyes closed, and the pupils contracted. Unless relief is obtained, the countenance assumes a ghastly character, the pulse becomes more and more feeble, the muscles are exceedingly relaxed; and death closes the scene. Should he, on the other hand, recover from this state of coma, it generally passes into deep sleep, which usually terminates in from twenty-four to thirty-six hours; and is followed by nausea, vomiting, giddiness, and loathing of food. (Christison.)

Opium does not affect all persons alike. There is perhaps no article of the materia medica, which disagrees with so many individuals, or, in other words, which so often produces effects on the system not desired by the physician; and frequently there is a capriciousness in this respect, which is as strange as it is inexplicable; —the drug itself, or some of its preparations producing disagreeable impressions, whilst congenerous preparations have all the pleasant and soothing operation that is desired. These disagreeable phenomena are—in place of sleep or a placid condition,—fever, quick pulse, headache, restlessness, watching, delirium, nausea and vomiting. They are considered to be—and, doubtless, usually are—the result of idiosyncrasy; but Dr. Christison asserts, that he has known them induced in those with whom opium in general agrees, if they happened to take it in too large a dose, or soon after a full meal with more than an ordinary allowance of wine. Perhaps the preparation, that is the least likely to produce these results, is the muriate or one of the other salts of morphia. The black drop is, also, an excellent preparation; and the author has often found *Tinctura Opii camphorata* and *Pulvis Ipecacuanhæ compositus* succeed, when opium in substance, or *Tinctura Opii*, could not be tolerated.

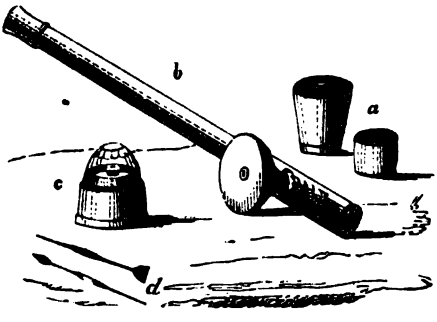
In regard to the susceptibility of individuals to the action of opiates, there is much diversity. Some resist large quantities, and it has been shown, that by habit the endurance or tolerance becomes astonishing. Others, on the contrary, are affected by the smallest quantities. This has to be discovered by observation of special cases; and a single dose is sufficient to communicate the information. It is essential, however, to bear in mind, that infants are extremely impressible to its action, and that a drop of laudanum cannot always be administered with safety to an infant a few weeks old. Professor J. B. Beck, of New York, in his '*Essays on Infant Therapeutics*,' has correctly urged, that it acts with much greater energy on the infant than on the adult, and that it is more uncertain in its action; and he cites many fatal cases from small doses. From a report made to the House of Commons, containing returns from the coroners of England and Wales of the inquests held during the years 1837 and 1838, in cases of death from poison, it appears, that the total number of deaths by poison was 543, of which 52 were infants, most of them at the breast, poisoned by opium or some of its preparations, which had been given by mothers and nurses in ignorance of its dangerous consequences. In addition to these, 20 were destroyed by opium or laudanum given in mistake for other remedies.

The action of opium is modified, too, according to the surface to which it is applied. The full effect is induced when taken into the stomach. When thrown into the rectum, the general rule is to give it in three times the quantity that would be administered in the same case by the mouth. This rule has, however, been strongly objected to as one of universal application; and there may be cases in which the practitioner might be surprised to see unusual effects induced by it; but such a case has never fallen under the author's observation. "It is conceived"—says Dr. Christison—"in some continental countries, especially in France, that it acts three or four times more energetically through the rectum than by the stomach. This must be an error; for in Britain it is not uncommon to give sixty minims of laudanum or four grains of opium by the rectum,—doses which, according to the French view, ought to occasion always alarming symptoms, and sometimes even death." A safe plan would be, to inject the same quantity—if a full dose—as would be prescribed by the mouth, and repeat the dose every half hour, until its effects are apparent.

It is in disease, however, that we witness the most anomalous resistance to the action of opium. It can rarely happen, that the patient is rendered more impressible to it; and in a large class of diseases the resistance to it is so great, that, occasionally enormous doses are needed. For example, in spasmodic affections, such as tetanus, hydrophobia, neuralgia,—and indeed in other neuroses—as mania, delirium tremens, &c.,—the quantities required to produce the narcotic effects of the drug are often enormous; and even when the erethitic condition of the nervous system has been overcome, no phenomenon may exist indicating that a narcotic has been taken.

When applied to the denuded skin or endermically, opiates do not act as energetically on the system as when administered by the mouth or rectum; but not unfrequently, where opium disagrees, the endermic application can be tolerated, and all the beneficial results of the narcotic be obtained. The effects of opium, when received into the air-tubes in the form of smoke, we have no opportunity of observing, except in the way of experiment. By the Orientals it is employed in enormous quantities. The Chinese use an aqueous

Fig. 85.



Apparatus for smoking opium.

extract for this purpose, which they term *Chandoo*, and the effects would appear to be the same as when swallowed; yet, as Dr. Christison has remarked, opium is known to be decomposed by such a heat as is necessary in the process of smoking a pipe, and none of its active principles are volatilizable. He adds, that several of his pupils have tried the process with a Chinese pipe, and Chinese extract; but experienced no other effects than severe headache and sickness.

Figure 85 represents the apparatus employed by the Chinese; which—as Messrs. Mohr and Redwood remark—may suggest the application of suitable means in like cases. The aqueous extract, *Chandoo*, is kept in small pots, *a*. The pipe *b*, consists of a wooden tube, near to one end of which is attached an earthen bowl of a conical shape, having a small aperture in the centre of the top. A lamp, *c*, is used in the process, and likewise the small iron instruments, *d*. The smoker, having lighted the lamp, lays his head upon a pillow, and takes a small portion of the extract of opium on the point of one of the instruments, *d*. He then ignites it in the lamp, introduces it into the bowl of the pipe through the aperture at the top; applies the bowl to the flame so as to heat it, and inhales the smoke at the open end of the tube. A whiff or two is all that can be obtained from a single charge of the pipe, but this—it is said—is sufficient to produce the soothing effects of the drug.

The remarks made as to the therapeutical application of narcotics apply rigidly to opium; and the great point to be borne in mind is, —the difference in its action according to the dose in which it is given; excitant—as we have seen—in a small dose; sedative in a large.

In fever—as elsewhere stated—it is beneficial under numerous conditions, especially where there is insomnia, great restlessness, low delirium or tremor. Where much cerebral disturbance exists, it has been advised to give it in combination with tartrate of antimony and potassa. Still, the main effective agent is the opium. Its valuable sedative influence renders it well adapted for many inflammatory diseases; although, at one time, when its *modus operandi* was less understood, it was carefully avoided in those diseases, under the idea that it might induce undue excitement. Nor does it diminish the exalted organic actions, but it lessens pain, and causes sleep.

After bloodletting has been employed, a full dose of opium is often one of the most precious sedatives that can be prescribed. In the inflammations of the lining membrane of the intestinal canal, opium is a most valuable remedy. In simple diarrhœa, it is often employed alone or associated with chalk and aromatics; in ordinary cholera morbus, a full dose frequently relieves almost instantaneously; and in dysentery its combination with calomel is often advantageous. In too great secretion from the mucous membrane of the bowels, it allays, by its sedative action, the inflammatory or other irritation, and thus diminishes the secretion, and at the same time, the increased peristaltic action. In encephalitis alone, doubt might exist as to the propriety of its administration, and some have pronounced it to be positively injurious in that form in which the cerebral substance is inflamed, and indeed in inflammation of the parenchymatous tissue of organs in general; but although more caution may be required in encephalitis in its administration, there is little, if any, reason for the belief, that it is injurious in parenchymatous inflammation, provided it be prescribed with a due knowledge of its properties; indeed, it has been before shown, that in pneumonia its administration is often attended with signal advantage, when it is given in appropriate doses.

In acute rheumatism it has been prescribed largely, and with much benefit, both alone, and associated with ipecacuanha; and a full dose often arrests an ordinary catarrh or inflammatory sore throat at its very inception.

In the various neuroses, it has been copiously administered. In mania, for example, the excessive excitement has been overpowered by full doses of opiates; and in delirium tremens, it has been by some considered a sheet-anchor. It is, however, in spasmodic diseases, that it is most trusted to. In every variety of these, it is used beneficially, and in the more violent, as tetanus, hydrophobia, &c. —although too often insufficient—more trust is reposed in it than in any other remedy. But it is almost impracticable to point out the numerous cases in which this invaluable anodyne and hypnotic is capable of rendering service. A due knowledge of its properties cannot fail to suggest those in which its operation will be beneficial.

When employed topically, it is chiefly with the view of relieving pain, although its anodyne and other virtues are not readily exerted through the cuticle. In cases, however, in which there is cutaneous ulceration or abrasion of any kind, the anodyne effect is signally apparent. It is prescribed in certain cases of ophthalmia, in painful ulcerations of all kinds, and in painful chronic, cutaneous diseases; and Dr. Christison affirms, that in erythema and in all kinds of erysipelas—even idiopathic erysipelas of the face—the best of all applications, not merely for allaying pain, but likewise for arresting the local inflammatory action, is a lotion made by preparing an infusion of 32 grains of *opium* in four fluidounces of *water*, and a solution of as much *acetate of lead*, in the same quantity of water; mixing the solutions, and filtering the mixture to separate the insoluble meconate of lead. Opiate frictions have likewise been used in chronic rheumatism, in sprains, and in deep-seated painful affections in general, no matter of what character. Opium is, moreover, employed in similar cases in the form of plaster; is applied to the bottom of a carious tooth; and is added to the most varied topical applications,—always, however, with the view of allaying pain or irritation.

The dose of opium varies, according to the effect which it is desired to induce. As an excitant narcotic, it may be given to the amount of a quarter or half a grain. To induce its ordinary anodyne and hypnotic effects, the dose is a grain or a grain and a half; and a full dose, capable of exciting all the sedative operation of the narcotic, is from two to four grains. The last quantity should only be given, however, where pain is inordinate; spasm severe; or where a powerful sedative influence is needed after bloodletting. It is usually prescribed in the form of pill.

At times it is used as a suppository,—four or five grains being formed into a cylinder with soap, and introduced into the rectum, in painful affections of the uterus or rectum.

EXTRAC'TUM OPII, EXTRACT OF OPIUM.—This extract, introduced into the last Pharmacopœia of the United States (1851), is made by exhausting *opium* by *water*, and evaporating to the proper consistence. It has the advantage of enabling the active ingredients of opium to be given in solution, and it is considered to be of about twice the strength of opium.

PIL'ULÆ O'PII, PILLS OF O'PIUM.—(*Opii* pulv. ʒj; *Sapon.* gr. xij; to be divided into 60 pills.) Each of these contains a grain of opium; the soap serving no other purpose than to communicate the proper consistence.

Into the last editions of the Pharmacopœia of the United States an analogous formula has been introduced, under the name **PIL'ULÆ SAPO'NIS COMPOS'ITÆ, COMPOUND PILLS OF SOAP.**—In this, half an ounce of *opium* in powder, is beaten with two ounces of *soap*, so as to form a pilular mass. The object of this formula is, to enable opium to be prescribed in cases where it is deemed advisable that the patient should not know he is taking it.

CONFEC'TIO O'PII, CONFEC'TION OF O'PIUM.—(*Opii* pulv. ʒivss; *Pulv. aromat.* ʒvj; *Mel. despumat.* ℥xiv.) This is a relic of the old *Philonium*, and has been much used; but is not so at present.

The aromatic powder, associated with the opium, makes it an excitant narcotic, adapted for cases of flatulent colic, and for atony of the digestive organs. It is most frequently, perhaps, prescribed in cases of diarrhœa unaccompanied by vascular excitement. When added to cinchona or to sulphate of quinia, it is said to increase greatly their efficacy in obstinate intermittents. About 36 grains of the confection contain one grain of opium.

TINCTU'RA O'PII, TINCTURE OF O'PIUM.—(*Opii* pulv. ℥iiss; *Alcohol. dilut.* Oij.) *Laudanum*—for so tincture of opium is commonly termed—is more frequently used than any other preparation of the drug, and this mainly owing to the facility with which it can be given.

About one grain of opium may be contained in about thirteen minims of the tincture, although it is not easy to fix upon the exact proportion. Twenty-five ordinary drops are generally regarded as equivalent to a grain of opium. The dose varies from twenty-five drops to a hundred. The tincture should always be clear. When not so, it is owing to the deposition of opium, which may add materially to the strength if it be shaken.

TINCTU'RA O'PII ACETA'TA, AC''ETATED TINC'TURE OF O'PIUM.—(*Opii* ℥ij; *Aceti* f℥xij; *Alcohol.* Oss.) This preparation is prescribed in the same cases as *Acetum opii* or *black drop*. Its dose is ten minims, or about twenty drops, which are considered to be equivalent to a grain of opium.

TINCTU'RA O'PII CAMPHORA'TA, CAMPH'ORATED TINC'TURE OF O'PIUM.—(*Opii* pulv.; *Acid. Benzoic.* āā ʒi; *Ol. anisi* fʒi; *Mel despumat.* ℥ij; *Camphor.* ℈ij; *Alcohol. dilut.* Oij.) This is the well known *Paregoric Elixir*, much used in popular practice. It is an agreeable preparation, owing to the aromatic and saccharine additions, which cause it to agree, at times, with persons when the tincture of opium cannot be tolerated. By reason of the comparatively small quantity of opium contained in it, it is not well adapted for cases in which powerful opiates are indicated; but is greatly used where gentle opiates are needed—as to allay cough, and procure sleep in children. Rather less than a grain is contained in half a fluidounce of the tincture. The ordinary dose, for an adult, is a fluidrachm, or a teaspoonful.

VINUM O'PII, WINE OF O'PIUM.—(*Opii* pulv. ℥ij; *Cinnam.* contus.; *Caryophyll.* contus. āā ʒj; *Vini albi* Oj.) This is the *Laudanum of Sydenham*, in contradistinction to *Laudanum* or *Liquid Laudanum*, just described. Wine dissolves the active principles of opium; and the aromatics may adapt it for cases in which the Tinctura Opii disagrees. It is not much used, however, internally. It has been dropped on the conjunctiva in turgid states of the vessels of that membrane, and with decided advantage; especially where there has been great sensibility. The dose of the wine for internal administration is the same as that of the Tinctura Opii.

ACE'TUM O'PII, VIN'EGAR OF O'PIUM, BLACK DROP.—(*Opii*, in pulv. crass. ℥viij; *Myrist.* in pulv. crass. ℥iss; *Croci* ℥ss; *Sacchar.* ℥xij; *Acet. destillat.* q. s. The opium, nutmeg and saffron are digested in a pint and a half of distilled water for forty-eight hours. The fluid is then strained, and the residue digested in an equal quantity of distilled vinegar for twenty-four hours. The whole is then passed and repassed by displacement, until it comes away clear; and distilled vinegar, enough to make the product three pints, is passed through. The sugar is then added, and the whole evaporated to three pints and four fluidounces.)

This is essentially a solution of the principles of opium in vinegar; rendered slightly excitant by the nutmeg, and colored by saffron. It is the officinal *black drop;* and is intended as a substitute for the celebrated empirical medicine, called by that name, and sometimes the *Lancaster* or *Quaker's Black Drop.* It is adapted for many cases in which opium produces its disagreeable effects, and is a favorite article with many practitioners. It is stronger than tincture of opium, the ordinary dose being from vj to xxx drops.

EMPLAS'TRUM O'PII, O'PIUM PLASTER.—(*Opii* pulv. ℥ij; *Picis abietis* ℥iij; *Emplast. plumbi* ℔j; *Aquæ bullientis* f℥iv.) The lead plaster and Burgundy pitch are melted together; the opium, previously mixed with the water, is added; and the whole is boiled over a gentle fire to the proper consistence. This plaster is employed to relieve neuralgic and other pains, being applied immediately over their seat.

Opium forms part of *Pulvis ipecacuanhæ et opii* and *Trochisci glycyrrhizæ et opii* of the Pharmacopœia of the United States.

MOR'PHIA.

In the London Pharmacopœia, morphia is directed to be precipitated by the addition of *solution of ammonia* to *chlorohydrate* or *muriate of morphia*, which lays hold of the chlorohydric acid, and separates the morphia. In the Pharmacopœia of the United States, morphia is separated from opium by successive macerations in *distilled water* until the salt of morphia is extracted. The fluid of the macerations is then mixed and filtered; and *alcohol* and *solution of ammonia* are added, by which the meconate or other salt of morphia is decomposed;—the alcohol dissolving the coloring matter as soon as it is separated by the ammonia; and the morphia itself being precipitated in a purer state.

The crystals of morphia are colorless, and wholly inodorous. They are scarcely soluble in cold water, and very slightly so in boiling water, but are readily dissolved by boiling alcohol. They have an alkaline reaction, and their primary form is the right rhombic prism. Morphia dissolves readily in dilute acids, neutralizes them, and forms salts, which are for the most part soluble, permanent, and crystallizable, and are used in medicine.

On account of its very sparing solubility in water, it is but seldom prescribed, although it has been affirmed by one observer, M. Balley, that it is equally efficacious with any of its salts. As this, however, is probably owing to the presence of acid in the stomach, and the amount of acid varies, the salts of morphia generally, if not always, at the present day, receive the preference. The dose is one-sixteenth to one-fourth of a grain.

1. MOR'PHIÆ ACE'TAS.—AC''ETATE OF MOR'PHIA.

Acetate of morphia is made by mixing *morphia* in powder, freed from narcotin by boiling in sulphuric ether, with *distilled water*, and carefully adding *acetic acid*, until the morphia is saturated and dissolved. The solution is then evaporated, and the acetate is dried with a gentle heat, and rubbed into powder.

Acetate of morphia, obtained in this way, is amorphous and not wholly soluble in water, in consequence of its containing a portion of free morphia, which, however, is rendered soluble by the addition of a few drops of acetic acid. It is less soluble in alcohol than in water.

The salts of morphia may be administered advantageously, not only in cases where opium is indicated, but where it disagrees. With many persons, and in many cases, they possess decided advantages over opium; but the author has pretty generally found that where opium has disagreed, morphia and its preparations have done so.

By one method of exhibition—the endermic—the salts of morphia can be used where opium and its preparations cannot. This method is adopted when opium or the salts of morphia cannot be borne internally; and when a blister has been prescribed in neuralgic and other cases, it is not uncommon to direct the denuded surface to be sprinkled or dressed with a salt of morphia. A quarter of a grain or more is placed upon the cutis vera, and this is repeated should the case require it. In the severer neuralgic and neurotic cases, the quantity applied in this way is sometimes very large. In a case of hydrophobia reported by Dr. Burne, ten grains at a time were sprinkled on a blistered surface with excellent tranquillizing effects. Occasionally, when applied to a blistered surface for several days in succession, a papular eruption is observed, which has quickly become vesicular, proceeding from the edges of the blister, and gradually spreading over the entire surface.

It has been proposed to inoculate with the salts of morphia. When thus used—the point of a lancet being dipped in an aqueous solution of the salt—they give occasion to the formation of a papula surrounded by an areola, and accompanied by itching, which is at its height in about an hour. In one case,—in which thirteen punctures were made on the anterior part of the forearm,—the patient experienced heaviness of the head; frequent yawning; clamminess of mouth; and an invincible desire to sleep; yet the quantity of the salt of morphia used could not have been more than a quarter of a grain. It has been suggested, that inoculation with morphia may supersede the use of blisters and ammoniacal plasters. Its influence as a rubefacient is marked; and hence perhaps, in part, its utility in neuralgia and chronic rheumatism. Mr. Rynd employed inoculation with a mixture of 10 or 15 grains of acetate of morphia, and a drachm of creasote with much advantage. Punctures were made over the nerves affected, and the solution was introduced. In a short space of time, the pain was relieved or wholly disappeared.

Acetate of morphia has also been given in *injection* in cases of chronic diarrhœa, and it has been made into an *ointment* to be rubbed over pained parts, or applied immediately to them, where this is practicable. In the dose of a fourth of a grain, every half hour, it was found by M. Gérard, to be preferable to every other remedy in cholera. He continued it until the serious symptoms—the spasms, diarrhœa, and vomiting—had ceased, or reaction ensued.

The ordinary dose of acetate of morphia is from an eighth to a quarter of a grain, repeated so as to induce the anodyne or hypnotic effect. As in the case of opium,—under excessive pain, or long-continued use, the system may be so habituated to its action as to bear very large doses. A case has been published in which a female, under a painful affection, took scruple, and—according to her own report—half-drachm doses of the acetate.

2. MOR'PHIÆ MU'RIAS.—MU'RIATE OF MOR'PHIA.

Muriate of morphia of the Pharmacopœia of the United States is made by mixing *morphia*, in powder, with *distilled water*, and carefully adding *muriatic acid* till the morphia is saturated and dissolved. The solution is then evaporated until crystals form upon cooling. These crystals are of a snow-white feathery appearance, and wholly soluble in water. They are devoid of smell, and are of a bitter taste.

This salt of morphia is but little used in this country; but is more prescribed than either of the others in Great Britain. There are some indeed, who prefer it to the sulphate, which is most frequently given here; but it is probable that more accurate observation would show, that they are capable of being substituted, in all cases, for each other. The dose of the muriate is the same as that of the acetate.

3. MOR'PHIÆ SULPHAS.—SULPHATE OF MOR'PHIA.

Sulphate of morphia is formed in the same manner as the muriate —*diluted sulphuric* acid being substituted for *muriatic acid.* It is in snow-white feathery crystals, which are wholly soluble in water. Dr. M. J. Bailey, of New York, special examiner of drugs, medicines, &c., in the United States Customs at that port, in his report to the New York Academy of Medicine, in June, 1849, states that he has in his possession a sample of French sulphate of morphia adulterated by the admixture of about 30 per cent. of amygdalin. The dose of the sulphate is the same as that of the acetate.

LIQUOR MOR'PHIÆ SULPHA'TIS, SOLU'TION OF SULPHATE OF MOR'PHIA (*Morphiæ sulphat.* gr. viii; *Aquæ destillat.* Oss).—This solution undergoes change by keeping, and admits of minute quantities of the sulphate being administered. A fluidrachm, or about a teaspoonful, contains one-eighth of a grain.

A combination of nitric acid with opium, forming a NITRATE OF MORPHIA, is the basis of a mixture attributed to Dr. Baillie, of London, and of another, which has been much used in this country in dysentery and chronic diarrhœa, under the name of *Hope's Mixture*, so called from its proposer. It is made as follows:—*Acid. nitros.* seu *nitric.* fʒj; *Aquæ camphor.* f℥viij; *Tinct. opii* gtt. xl. Dose, a fourth part every three or four hours.

Many years ago, a LIQUOR MORPHIÆ CITRATIS was directed to be prepared in the following manner. Beat four ounces of the best crude *opium* in a mortar with two ounces of crystallized *citric acid;* mix well with a pint of *boiling water*, and filter after 24 hours' maceration. This was proposed by Dr. Porter, of England, and is spoken well of by Dr. Paris. M. Magendie recommends a citrate to be formed more immediately, according to the following formula. *Morphiæ pur.* gr. xvi; *Acid. citric.* crystalliz. gr. viii; *Aquæ destillat.* ℥j; *Tinct. cocci* q. s. ut fiat solutio. The dose is 20 to 24 drops in the 24 hours.

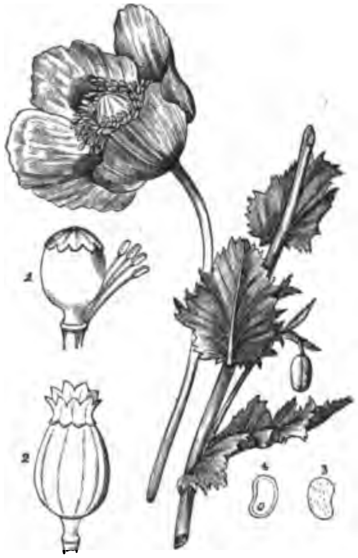
A TARTRATE OF MORPHIA was suggested by the author's friend, Mr. C. T. Haden, as a substitute for the *liquor opii sedativus* of Mr. Battley,—a nostrum. Mr. Haden prepared it by macerating the dregs remaining after making tincture of opium in a solution of tartaric acid. Forty drops acted in every respect like twenty of the liquor opii sedativus. It did not excite, nor did it induce costiveness.

A BIMECONATE OF MORPHIA has been introduced by Mr. Squire, of London, and has been highly spoken of as an anodyne and hypnotic; but the formula for its preparation has not been given to the profession. The same may be said of a preparation termed *McMunn's Elixir of Opium.*

All these preparations have been advised, especially where opium disagrees. The author has not been fortunate with the last. In his own case, it produced the ordinary effects of opium and nothing more, and in another case, in which he permitted himself to employ it at the urgent recommendation of a professional friend, and in which every preparation of opium gave occasion to unpleasant effects, it was by no means an exception.

2. PAPA'VER.—POP'PYHEADS.

Fig. 86.



Papaver somniferum.

1. Capsule of Papaver officinale, var. album.
2. do. of Papaver somniferum, var. nigrum.
3, 4. Seeds.

Papaver somniferum, *Somniferous or White Poppy;* Sex. Syst. Polyandria Monogynia; Nat. Ord. Papaveraceæ; is indigenous in Asia and Egypt, and grows wild in some parts of England, having probably escaped from gardens. (Pereira.) It is cultivated in oriental countries for the sake of opium, and in Europe for its heads or capsules, as well as for the oil contained in the seeds, which is used in the arts. The heads are obtained generally from the white variety, being the largest; and they are directed by the Edinburgh College to be gathered before they are wholly ripe, because at that time they abound in the milky juice of which opium is made; whilst, if allowed to ripen before they are plucked, as directed by the London and Dublin Colleges, the juice is in a great measure exhausted. As met with in the shops, they vary in size from that of a hen's egg to that of the fist; are of a dirty white or purplish-brown color; of a papyraceous texture; devoid of smell, and have a slightly bitter taste. When subjected to analysis, they contain principles similar to those of opium, which they readily impart to water.

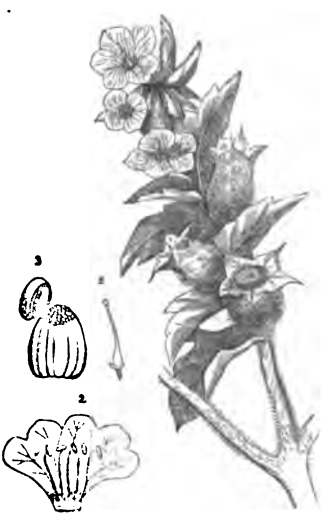
The preparations of poppyheads are exceedingly variable in strength, partly owing to their being gathered at different stages of their growth, and partly, also, owing to differences in the variety of the plant used; and they are, consequently, but rarely prescribed internally. They have been thought, by some, to agree where opium did not, but this is doubtful; and they are not adapted for any purposes which opium does not better subserve.

The decoction is much used in Great Britain as an anodyne fomentation; although it has been properly questioned, whether it produces any effect which would not equally follow the use of a mucilaginous decoction.

3. HYOSCY'AMUS.—HENBANE.

Hyoscyamus niger, *Common Henbane;* Sex. Syst. Pentandria Monogynia; Nat. Ord. Solanaceæ; is indigenous in many parts of Europe, and is cultivated for medicinal purposes. It has been introduced into this country, in the northern and eastern parts of which it is found in the vicinity of the older settlements. It flowers in July. The leaves—HYOSCY'AMI FO'LIA—and the seeds—HYOSCY'AMI SEMEN—are officinal in the Pharmacopœia of the United States. It is generally recommended that the plant should be gathered when in flower; but it has been found sufficiently active in the spring before the appearance of the flowering stem. The wild plant, as in the case of other narcotics, has been esteemed preferable to the cultivated; but Dr. Christison affirms that, from experiments made at the Royal Infirmary of Edinburgh, the inferiority of cultivated plants, if it exists at all, seems not to be appreciable in practice. The plant is said to be only fit for medicinal use in the second year. The fresh herb has a disagreeable virous smell, and a mucilaginous slightly acrid taste. The leaves should be dried at a temperature not exceeding 120° Fahr., by which process 100 lbs. of the fresh herb are said to lose 86 per cent. When dried, they ought to preserve, in some measure, their odor. The seeds have the smell of the plant, and a bitter taste.

Fig. 87.



Hyoscyamus niger.

1. Stigma. 2. Corolla. 3. Capsule.

Both the seeds and extract have been analyzed; and found to contain a vegetable alkali, almost identical with atropia, to which the name *Hyoscyamia* or *Hyosciamina* has been given. An empyreumatic oil of henbane, whose properties resemble those of the empyreumatic oil of foxglove, was obtained by destructive distillation, which proved to be a powerful narcotic poison.

In large doses, hyoscyamus is an acro-narcotic poison, occasioning at times,—but not so often as belladonna and stramonium,—nausea and vomiting, purging, disturbance of vision, dilatation of the pupil, coma, and often delirium, followed by death. In medicinal doses, it exerts a soothing influence over the nervous system, without that manifest precursory excitement which is produced by many of the articles of the class. In larger doses still it acts as a hypnotic; at least such is the general belief. It must be admitted, however, that it frequently fails; and it is affirmed to induce delirium when pushed to a great extent. It certainly is not at all comparable to opium as an anodyne and hypnotic; yet there are cases in which opium and its preparations disagree, where henbane may be prescribed as a substitute. For example, opium, even in small doses, occasions, in particular persons, violent cephalalgia, nausea, and vomiting, and is apt to induce constipation; none of which phenomena follow the use of hyoscyamus. It is not, however, extensively employed; for whilst one respectable writer, Dr. Wood of Philadelphia, remarks, that it is "at present used almost exclusively to relieve pain, procure sleep, or quiet irregular, nervous action:" another, Dr. Christison, states, that "probably the chief consumption of it nowadays is in combination with those purgatives which cause griping, and more especially with the compound colocynth pill-mass."

It is unnecessary to enumerate the cases in which hyoscyamus is given internally. It would be but repeating what is said under the various narcotics. Wherever an anodyne, hypnotic, or antispasmodic is needed, it is prescribed; and, as already shown, there may be cases in which it may be used when opium cannot; although whenever the latter can be borne, it is infinitely preferable. Like belladonna, it may be used to dilate the pupil, but it is not so energetic; and like it, it has been employed in the way of injection, and as a fomentation in painful tumefactions and ulcerations.

The dose of the powdered leaves—which, however, are rarely prescribed—is from gr. v to gr. x.

EXTRAC'TUM HYOSCY'AMI, EXTRACT OF HENBANE, is the inspissated juice of the leaves. 112 lbs. of the fresh plant yield from 4 to 5 lbs., according to Mr. Brande; according to Mr. Squire, ℔v, ℥ix. That used in this country is chiefly obtained from Great Britain; and is very variable in its quality. It is the preparation of henbane, which is most commonly prescribed,—being given internally in the dose of gr. v to gr. x, or more. It is a common adjunct to the compound extract of colocynth and to aloes, whose irritating qualities it obviates; so that in pregnancy, pills of aloes and hyoscyamus may be taken with safety. Like other narcotic extracts, it may be added to topical applications to tender parts—as to hemorrhoids; and it is occasionally formed into a plaster, which is used in neuralgic pains, glandular and scirrhous swellings, &c.

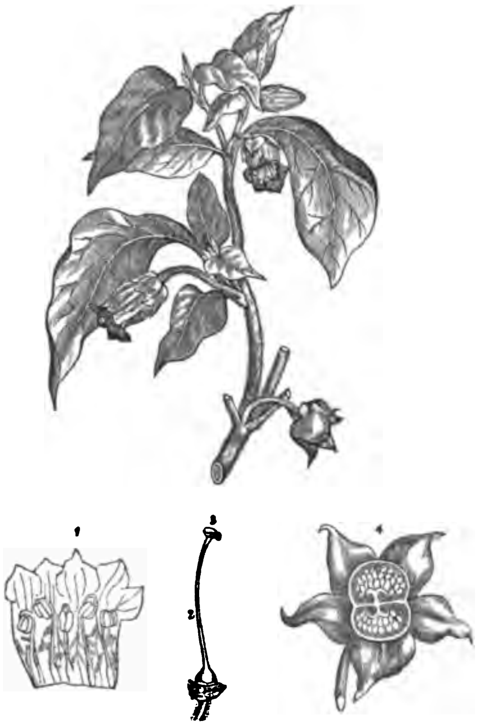
An **ALCOHOL'IC EXTRACT OF HYOSCY'AMUS—EXTRAC'TUM HYOSCY'AMI ALCOHOL'ICUM,** was introduced into the edition of the Pharmacopœia of the United States of 1842. It is made from the leaves in coarse powder. The dose is about the same as that of the simple extract, than which it has been regarded as more certain.

TINCTU'RA HYOSCY'AMI, TINCTURE OF HENBANE.—(*Hyoscyam. fol.* ℥iv; *Alcohol. dilut.* Oij; prepared either by simple maceration or by displacement.) The dose as a hypnotic is fʒj to fʒij. Should it act on the bowels, it has been suggested, that a very small quantity of the tincture of opium should be added to it, which may be done in cases where opium does not disagree.

4. BELLADON'NA.

Belladonna is the officinal name, in the United States Pharmaco-

Fig. 88.



Atropa belladonna.

1. Stamens. 2. Style. 3. Stigma. 4. Berry and Seeds.

pœia, of the leaves of *Atropa Belladonna*, *Common Dwale*, *Deadly Nightshade;* Sex. Syst. Pentandria Monogynia; Nat. Ord. Solanaceæ, a plant, which is a native of Europe, growing in hedges and waste ground on a calcareous soil; flowering in June and July, and ripening its fruit in September. The leaves are usually collected before the flowers bloom, or soon afterwards. The root, also, is officinal in the Dublin Pharmacopœia. The dried leaves are of a dull greenish color, with a feeble narcotic smell, and a subacrid and slightly nauseous taste. They impart their virtues to both water and alcohol.

On analysis, belladonna yields a vegetable alkaloid —*Atropia*—on which the narcotic properties appear to be dependent, and which may be obtained by a process similar to that for procuring aconitia from aconite. This principle has not been admitted into the Pharmacopœias. It is a most virulent poison—a tenth of a grain causing, in the human subject, dryness of the mouth, constriction of the throat, difficulty of deglutition, headache, dilatation of the pupil, and stupor.

Belladonna is a powerful narcotic poison in large doses. To a less extent it possesses the ordinary properties of the narcotics, along with some that are peculiar to itself. When carried to such an extent as to affect the system, it induces dryness of the mouth and throat, vertigo, dilatation of the pupils, and dimness of sight; when to a greater extent, delirium, and—it is affirmed—an eruption closely resembling that of scarlatina. To this, reference will be made presently.

The first set of symptoms were induced on the author by tasting some newly-prepared extract of belladonna made by himself. The dilatation of the pupil continued for a fortnight,—becoming gradually less and less, but impairing vision whilst it persisted. These effects show, that the main action of belladonna is exerted upon the organs of innervation: those of secretion become modified subsequently.

Belladonna is administered in many diseases for the purpose of allaying pain, or diminishing the impressibility of the nervous centres or of the nervous radicles. In this respect, it is, as a general rule, far inferior to opium; yet there are some diseases in which it occasionally succeeds after opium has failed; for example, in the various forms of neuralgia, in which it is often necessary to push the remedy, until some of the effects above mentioned are induced. Administered in this manner,—like the other narcotics, it has been prescribed in rheumatism.

In diseases characterized by great nervous impressibility, as hooping-cough, it has occasionally afforded relief; but it can only be regarded as a palliative in that singular self-limited malady. Dr. A. T. Thomson affords, however, the following strong testimony in its favor: "I have ordered the extract in doses of one-eighth of a grain to a child of eight years of age, and gradually increased the dose to a quarter of a grain. Its power over the cough is extraordinary. It produces a state of the skin closely resembling scarlatina, accompanied with fever, suffused eye, dimness of sight, and frequently, although not always, headache. Whilst these symptoms continue, the cough remains absent, but it returns as soon as they disappear. By keeping the habitfor a sufficient time under the influence of the remedy, the period of the disease has always been greatly shortened."

It has also been prescribed in epilepsy, mania, hysteria, chorea, and in the neuroses in general; but no marked effect has resulted, except what would probably have equally resulted from the employment of opium or some of its preparations.

Dr. Graves has ingeniously suggested its use in cases of fever accompanied with contraction of the pupil,—under the view, that the state of the brain, which accompanies dilatation of the pupil, is different from that which accompanies contraction; and hence, as belladonna occasions dilatation of the pupil, its administration may do much towards counteracting the condition of the encephalon that occasions the opposite condition of the pupil. Were this view, however, correct, it would seem equally probable, that as aconite produces contraction of the pupil, it ought to be a remedy for encephalic conditions that are accompanied by dilatation of the pupil; and farther, that aconite ought to be capable of counteracting the dilatation of the pupil occasioned by belladonna. These would be strange results if true.

The property possessed by belladonna of dilating the pupil adapts it for the treatment of certain diseases of the organ of vision. It is largely used by the surgeons of Europe, both for the purpose of exploration and treatment. In cases of cataract, for example, it enables the surgeon to appreciate the extent of the affection; and, in obscure diseases, to inspect the depth of the eyeball. In the operation for cataract, it allows of the lens passing out more readily. In iritis, it prevents adhesions between the posterior part of the iris and the anterior part of the capsule of the crystalline, or ruptures them when fresh. It is occasionally, also, used in inflammatory and other affections of the eye, to diminish the sensibility of the organ to light. For producing dilatation of the iris, a little of the extract may be rubbed with the wet finger round the eyelids, or a solution be dropped into the eye. In a few hours, the pupil generally becomes largely dilated, so much so, that the iris appears, at times, as if it were totally gone. This condition generally continues for a few days. A solution of atropia has been proposed in such cases, in the proportion of two grains dissolved in a drachm of alcohol to seven drachms of distilled water. A drop of this placed in the eye produces speedy and complete dilatation of the pupil in most cases; but, at times, a stronger solution is required. Where it is desirable to keep up the dilatation, a drop may be used night and morning. (*New Remedies*, 7th edit. p. 127, Philad., 1856.)

Owing to its effect upon the iris, belladonna has been suggested in labor accompanied with unusual rigidity of the os uteri. With this view, either the soft extract, or an ointment composed of *Extract of Belladonna* ʒj—ʒij; *Spermaceti Ointment* or *Lard* ℥j; may be rubbed upon the os uteri. It is not, however, much employed. In spasmodic and neuralgic affections of the urethra, bladder, rectum, and vagina, belladonna has been used, either applied to a bougie, or passed into the rectum, in the form of injection or suppository. In all cases, it is important, that there should be no abrasion,—as it might produce an undesirable narcotic impression upon the system.

In certain painful affections of the chest, and in painful scirrhous and glandular enlargements, a belladonna plaster is not unfrequently applied. The narcotic influence of the drug may be partially exerted in this way; but it is probably but little adapted for the removal of those affections.

There is one other application of belladonna, which remains to be particularly noticed—as a preventive of scarlatina. It has already been remarked, that when given to a certain extent, it is apt to induce a cutaneous efflorescence similar to that of scarlatina. This, of course, suggested to the homœopathist to make trials of the remedy as a prophylactic against that often formidable disease. In another work (*Practice of Medicine*, 3d edit. ii, 555, Philadelphia, 1848), the author has stated, that he has never witnessed the eruption, nor does its production seem to be considered necessary where belladonna has been given as a prophylactic. The testimony, for and against its preventive powers in scarlatina, has been considerable. It is easy to see, however, that inasmuch as all are not attacked, who are exposed to a disease which is unquestionably contagious, any article, exhibited with the view of prevention, may readily gain credit for the possession of such powers without meriting it. Still more readily may it, in the case of a disease like scarlatina, which in the opinion of many spreads by epidemic rather than by contagious influences. Belladonna certainly has often failed,—it did so in the author's own family—and a striking case of the kind is given by a respectable writer—Dr. Sigmond—of a family of eleven persons, who took it; yet every one of them was attacked. Numerous authentic cases of its entire failure have, indeed, been published. Hahnemann's direction for exhibiting it in such cases is to dissolve three grains of the *extract* in a fluidounce of *cinnamon water;* and to administer three drops of this solution, twice a day, to a child a year old,—adding one drop for every year,—until twelve drops are taken for a dose; this course to be adopted at the commencement of the epidemic, and to be persevered in whilst it continues.

The dose of the powdered leaves of belladonna is one grain, which may be gradually increased until its peculiar effects—dryness of the mouth, dilatation of the pupil, or some of the cephalic phenomena supervene. The powder is rarely, however, given internally. The fresh leaves are sometimes applied warm as a fomentation to pained parts; and, occasionally, an infusion is used for a similar purpose; or the powder is made to form part of a cataplasm.

The dose of atropia, according to M. Bouchardat, is a tenth part of a grain.

EXTRAC'TUM BELLADON'NÆ, EXTRACT OF BELLADON'NA.—This extract is made from the expressed juice of belladonna. It is the preparation most frequently used. The dose may be a quarter, or half a grain, repeated three times a day; and gradually increased until the constitutional effects of the remedy appear. It has, however, been given in much larger quantities. Its topical uses have already been referred to; but it may be added, that a *decoction* of the extract or of the leaves has been recommended, like other narcotics, as an inhalation in spasmodic asthma.

An **ALCOHOL'IC EXTRACT OF BELLADON'NA—EXTRAC'TUM BELLADON'NÆ ALCOHOL'ICUM**—was introduced into the edition of the Pharmacopœia of the United States of 1842. It is prepared by the action of *diluted alcohol,* by displacement, on *belladonna* in coarse powder. As the fresh leaves are not always attainable, this formula furnishes a method for obtaining the extract in their absence.

TINCTU'RA BELLADON'NÆ, TINCTURE OF BELLADON'NA.—(*Belladonn.* ℥iv; *Alcohol. dilut.* Oij; prepared by maceration or displacement.) The dose of the tincture is from ♏xx to ♏xl, watching the effects. It is officinal in the Pharmacopœia of the United States,—and in those of London and Dublin.

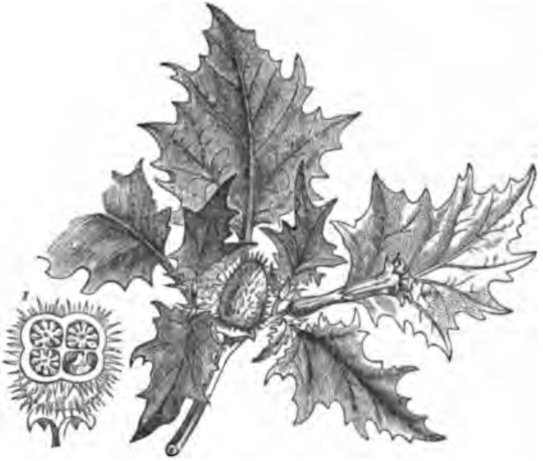
EMPLAS'TRUM BELLADON'NÆ, PLASTER OF BELLADON'NA.—(*Emplastr. Resin.* ℥iij; *Extract. Belladonnæ* ℥iss.) This plaster is used as an anodyne and revellent in neuralgic pains, and, indeed, in most painful affections that are deep-seated. Dr. Wood, of Philadelphia, states, that he has seen the constitutional effects of belladonna result from its application. Care ought to be taken not to apply it to an abraded surface.

UNGUENTUM BELLADON'NÆ.—OINTMENT OF BELLADON'NA.—(*Extract. Belladon.* ʒj; *Adipis* ℥j. M.) Used as a topical anodyne in various affections,—to the os uteri to diminish rigidity; rubbed over the course of the urethra and perineum, in chordee, and in spasm and irritation of the neck of the bladder, &c.

5. STRAMO'NIUM.

Datura Stramonium, *Thorn Apple*, *Jamestown Weed;* SEX. SYST. Pentandria Monogynia; NAT. ORD. Solanaceæ, is met with in various parts of Europe, Asia, and America: but its native country appears to be unknown. In the United States, it is very common in the vicinity of every inhabited spot, in waste ground, and on dunghills. It flowers from May to August, according to the temperature. The leaves, STRAMONII FOLIA; the root, STRAMONII RADIX; and the seeds, STRAMONII SEMEN, are officinal in the Pharmacopœia of the United States. The first are gathered when the flowers are full blown, at which time they possess an unpleasant virous odor, sufficient to produce a disagreeable impression on the olfactories, when the place is approached where the plant grows. Their taste is bitter and nauseous. The disagreeable odor is lost by drying, but the taste remains. The seeds are small, compressed, kidney-shaped, and of a brown, almost black, color, without smell, but having the bitter, nauseous taste of the leaves, and a somewhat acrid taste.

Fig. 89.



Datura Stramonium.

All parts of the plant yield their virtues to water, alcohol, and the fixed oils, which are consequently used in various preparations. The plant has been analyzed by different chemists, and found to contain an active vegetable alkali, to which the name *Daturia* or *Daturina* has been given, and which is separated in the same manner as *hyoscyamia.* It dilates the pupil, and is highly poisonous to animals, but is not used in medicine. By destructive distillation, a poisonous oil is obtained, which does not differ in its physical and chemical properties from the empyreumatic oil of foxglove.

Stramonium is a powerful narcotic, producing effects like those of belladonna, when taken in large doses,—as dryness of the throat, and delirium followed by coma, with dilated pupils, and at times convulsions. In medicinal doses, it appears to resemble hyoscyamus; to be anodyne, and, to a certain extent, hypnotic; rather tending to relax the bowels than to constipate, and agreeing where opium cannot be borne. Still, for internal use, it is less employed than the other narcotics already considered, although it may be used in the same cases. In spasmodic asthma—as elsewhere shown—it is made to come in contact with the pneumogastric nerves by inhalation, with marked advantage,—the benefit that results, in such cases, being from its narcotic influence. Like other narcotics it is also used externally, the leaves being applied warm to painful tumors, irritable ulcers, &c. For the purpose of dilating the pupil, as well as of diminishing the sensibility of the retina to the influence of light, belladonna is more used in Europe: in this country, the extract of stramonium is often employed. The dose of the powdered leaves is two or three grains; that of the seeds a grain, repeated until the constitutional influence is manifested, or until some effect is exhibited on the morbid phenomena.

EXTRAC'TUM STRAMO'NII FOLIO'RUM, EXTRACT OF STRAMO'NIUM LEAVES.—This is the inspissated juice evaporated.

EXTRAC'TUM STRAMO'NII SEM'INIS, EXTRACT OF STRAMO'NIUM SEED.—This is obtained from stramonium seed by the process of displacement, through the action of dilute alcohol. It is the *alcoholic extract of the seed*, and is preferable to the extract of the leaves. The dose of the former is a grain; of the latter half a grain, gradually increased. When applied to the eye to induce dilatation of the pupil, in the same cases as the extract of belladonna, it may be softened and gently rubbed over the eyelid; or a solution may be dropped into the eye.

TINCTU'RA STRAMO'NII, TINCTURE OF STRAMO'NIUM.—(*Stramon. sem.* contus. ℥iv; *Alcohol dilut.* Oij. Prepared either by maceration or by displacement.) The dose is ♏x to ♏xx, two or three times a day, given until some effect is induced. It may be prescribed wherever stramonium is indicated.

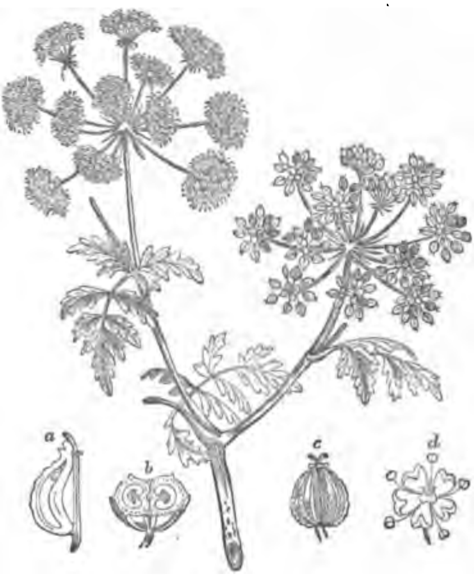
UNGUEN'TUM STRAMO'NII, OINTMENT OF STRAMO'NIUM.—(*Stramon. fol. recent.* concis. ℔j; *Adipis* ℔iij; *Ceræ flavæ* ℔ss. The leaves are boiled in the lard until they are friable, then strained, and to the product, the wax, previously melted, is added.) This ointment is used as an anodyne application to painful ulcers, hemorrhoids, &c., and is a great favorite with some surgeons, being prescribed in cases where others would use nothing more than simple cerate.

6. CONI'UM.—HEMLOCK.

Both the leaves, CONI'I FO'LIA, and the seed or fruit, CONI'I SEMEN, of *Conium maculatum*, are officinal in the Pharmacopœia of the United States. The plant, called also *common* or *spotted hemlock;* SEX. SYST. Pentandria Digynia; NAT. ORD. Umbelliferæ, is indigenous in Europe, and has been naturalized in the United States, and also in Chili, growing usually in waste grounds, and by the roadsides, especially in inhabited places. It flowers in June and July, and the fruit ripens in August and September. The whole plant has an exceedingly disagreeable virous smell, compared by some to that of mice; by others to that of cantharides, or of the urine of the cat, by which it may be distinguished from other umbelliferous plants. Its proper characteristics are botanical.

The plant is considered to be more active in warm countries, and in hot and dry seasons. The leaves are generally gathered when the plant is in full flower, or even later, when the fruit is forming. Dr. Christison, however, affirms as the result of his experiments, that there seems to be no great difference in its poisonous properties at any season, as even in November and March of its first year its activity is very great. The same gentleman remarks, that, contrary to the opinion of Geiger, the seeds have always appeared to him to be considerably more active when green than when ripe and dry: they are much more active than the leaves, and he considers this an objection to the adoption of the seeds by the London College as an article of the Materia Medica, and the remark would of course apply equally to the Pharmacopœia of the United States—unless they were used for some special purpose different from those to which the leaves are applied. A great advantage, however, of the seeds would seem to be, that they retain for a much longer time than the leaves their active principle unchanged.

Fig. 90.



Conium maculatum.

a. Vertical section of fruit. *b.* Transverse do. *c.* Fruit. *d.* Flower.

Hemlock leaves, when dried at a temperature not higher than 120° Fahr., and with exclusion of solar light, have a fine green color, and the characteristic smell of the plant. They should be preserved in tin canisters well closed. It would seem, however, that but little reliance can be placed upon the dried leaves; as, according to Dr. Pereira, however carefully they may be prepared, they sometimes yield none of the active principle, *conia*, even although they may have a fine green color, and the hemlock smell. The taste is nauseous, but much less so than that of the fresh plant. The seeds have very little odor, and a slight, somewhat bitter, and nauseous taste.

Conium has been repeatedly subjected to chemical analysis, but without any great advantage to pharmacology. One of the most curious results was obtained by Schräder, who found the analysis of the hemlock and cabbage to be strikingly analogous! When subjected to distillation, a volatile oil, of an acrid taste and of the peculiar odor of the plant, passes over, which is not, however, poisonous; hence, the smell of the leaves would be an unsatisfactory test of their activity. When triturated with a solution of potassa, an intense and peculiar odor is exhaled, arising from the disengagement of the active principle *Conia*, *Conein*, *Conicin*, or *Cicutin*, which is supposed to be present in combination with an acid; and requires the agency of an alkali to disengage it. It is possessed of wonderful activity as a poison. It cannot be procured from the dried leaves; but may be from the dried fruit.

Conium is one of the narcotics so strongly extolled by Störck in cancerous affections, not simply with the view of its narcotic action, but as a modifier of the system of nutrition,—a eutrophic. At the present day, however, the latter action has been more properly referred to the therapeutical agents prescribed with it; for the belief of its 'deobstruent' operation has now altogether passed away in the opinion of the best observers.

In regard to its precise effect on the cerebro-spinal system, and the phenomena induced by it, discordance of sentiment exists,—so much so, that Dr. Christison expresses the opinion, "that the entire subject of the medicinal actions and uses of hemlock requires to be investigated anew; and it well deserves investigation, considering its singular energy and peculiar effects as a poison."

Cases are on record, in which the leading symptom produced by it was coma; others have ascribed convulsions to it. On the other hand, the experiments of Dr. Christison led him to infer, that it does not excite convulsive spasms, or bring on insensibility; but that it exhausts the nervous energy of the spinal cord and voluntary muscles, occasioning merely convulsive tremors and slight twitches, and eventually general paralysis of the muscles, and consequent stoppage of the breathing. He found, however, that it leaves the heart's action unimpaired, and does not prevent the blood from coagulating—as was at one time imagined—any more than other causes of death by asphyxia. On the other hand, Mr. Judd infers from more recent experiments with medicinal doses on cats and other animals, that the well-made extract causes great languor and drowsiness, and often profound sleep for two or three hours; lessens muscular excitability, and reduces the circulation as well as animal heat. He is, consequently, induced to believe, that it really deserves the reputation it has enjoyed with many of being an efficient anodyne and hypnotic; he adds, that on some trials with it in affections of the chest, he found it allay cough and promote sleep, and he considers it especially applicable to the treatment of hypertrophy of the heart, phrenitis, and other affections attended with an excited or excitable state of the circulation.

Dr. Pliny Earle instituted certain experiments upon himself, with the view of determining the physiological effects of the extract. In fifty-grain doses, it caused vertigo, dimness of vision, a feeling of mingled weariness and weakness in the knees; defective firmness in the gait; the same kind of feeling in the lower part of the biceps of the arm as in the knees, with a constant disposition to bend and extend the forearm. The pupils were apparently dilated; but it did not appear to induce any hypnotic effect. Dr. Earle states, that for several years he has been accustomed to the free use of the extract of conium in the treatment of insanity, without ever having produced sleep by it, even in doses gradually raised to 60, 80, and 90 grains, three times a day. The author has given the remedy a fair trial in various painful affections, but he has been dissatisfied with it; and is disposed to think, that it is often altogether inert. It is used internally in the same cases as the narcotics already described; and a *fomentation* of fresh hemlock leaves, or a *poultice* of the extract, or a *decoction* of the leaves, or a hemlock *ointment* or *plaster* is not unfrequently prescribed to allay the pain of malignant ulcerations, or of neuralgia.

Like some of the other remedies of the class, conium has been supposed to possess antaphrodisiac virtues; and has, consequently, been prescribed in cases in which there was over-excitement of the venereal appetite. It has also been supposed to have diuretic properties. In the experiments of Dr. Earle, however, there was no perceptible augmentation or diminution of the urine. On two occasions, once after taking one of the largest doses of the American, and once after one of the largest doses of the British extract, he felt an acute, lancinating, and transient pain in the region of the neck of the bladder, which he believed to have been caused by it.

The ordinary dose of powdered conium is three or four grains, twice or thrice a day,—the dose being gradually increased, until some degree of encephalic uneasiness is experienced. The powder, however, speedily loses its virtues, and different specimens appear to have different potency; so that care may be necessary, if a different specimen of the same preparation be given, that an overdose is not prescribed.

EXTRAC'TUM CONI'I, EXTRACT OF HEMLOCK.—This extract is prepared from the inspissated juice,—too much pressure being avoided, as the extract obtained in this manner is, according to Mr. Brande, less active. It is the preparation most frequently employed; yet it is unequal and always uncertain. Indeed, most of the extract of conium of the shops is inert. (Pereira.) It is considered to be of good quality only when it disengages the odor of conia, which is strong and penetrating, something like that of hemlock,—but more analogous to that of a combination of the odor of tobacco and mice. (Pereira.) It does not contain much conia at any time. From four ounces of the extract, obtained by Dr. Pereira from one of the most respectable druggists in London, he was unable to procure any sensible quantity of it. It would appear, that in the process of evaporation the conia is decomposed; and that in the very best extracts it disappears after they have been kept for some time. When we take all this into account, with the differences in the plant itself, according as it is wild—which is the most active—or cultivated, or as it is culled at different periods, it is obvious that no great dependence can be placed upon the greater part of the commercial extract. One hundred weight of the leaves yields from three to five pounds of extract. The ordinary dose is two or three grains gradually increased until some constitutional effect is induced. It is usually given in the form of pill.

In place of the Extract, Dr. Neligan, of Dublin, recommends the juice—*Succus conii*—which he obtains as follows:—Take of fresh hemlock leaves any quantity; express the juice in a tincture press; set it aside for forty-eight hours; pour off the clear supernatant liquor from the fecula and chlorophyll which it has deposited; and, lastly, add to it a fifth part by measure of rectified spirit. This preparation he has found to keep well for two years. The dose he gives is thirty minims three times a day in a little water. This may be increased to forty or sixty minims, and be decreased or wholly withdrawn according to the phenomena induced. The most unpleasant effect, when given in full doses, was a disagreeable sense of dryness in the throat, accompanied with a feeling of constriction, and some difficulty of swallowing. When this was the case, the medicine was omitted for a short time.

The United States Pharmacopœia has an **ALCOHOL'IC EXTRACT OF HEMLOCK—EXTRAC'TUM CONI'I ALCOHOL'ICUM**—which is made from the dried leaves, like the alcoholic extract of belladonna. It is applicable to the same cases as the ordinary extract, for which it is a substitute; although it is probably even less satisfactory.

TINCTU'RA CONI'I, TINCTURE OF HEMLOCK.—(*Conii fol.* ℥iv; *Alcohol. dilut.* Oij; prepared by maceration or by displacement.) The Edinburgh College prepares a tincture from the expressed juice, which, for the reasons before given, must be much more active than the tincture of the dried leaves. The dose is from fʒss to fʒj. A *tincture* of the dried fruit or seed has been proposed, which would necessarily be more active.

CONIA, the active principle of conium, has been used therapeutically of late years. It is most readily obtained, according to Dr. Christison, by cautiously distilling from a muriate of lime bath, a mixture of strong *solution of potassa* with the *alcoholic extract of the unripe fruit.* The conia passes over and floats upon the water like oil.

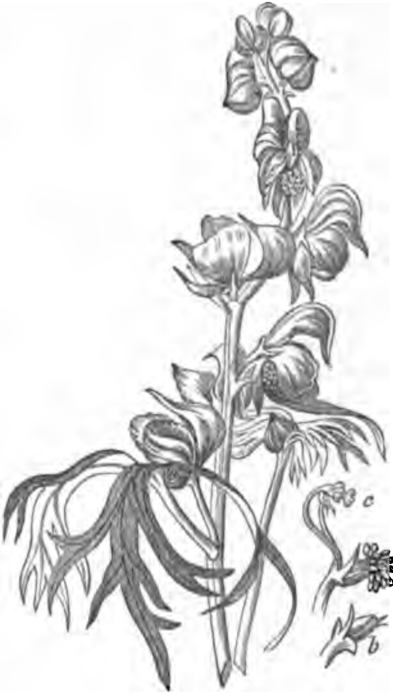
It is a colorless, oleaginous fluid, of an intense and peculiar suffocating odor, and an extremely acrid, benumbing taste; is sparingly soluble in water; very soluble in alcohol and ether, and in fixed and volatile oils.

Its effects on the economy are like those of conium; and it has been employed internally in the same diseases.

As an external application, it has been used in the form of oil; composed of *conia*, half a grain; *oil of sweet almonds*, a drachm, in cases of strumous photophobia,—applied twice or thrice daily, by means of a camel's hair pencil. In chronic cutaneous eruptions, it has proved serviceable, in the form of ointment made of from twelve to twenty-four drops of the *conia* to an ounce of *simple ointment* or *cold cream.* It has been used locally, also, in neuralgic, cancerous, and other painful affections.

7. ACONI'TUM.—AC'ONITE.

Fig. 91.



Aconitum napellus.

In the Pharmacopœia of the United States (1842), Aconitum is defined to be "the leaves of *Aconitum napellus* and of *A. paniculatum* (De Candolle)," *Wolf's bane* or *Monk's hood.* The last Pharmacopœia (1851) admits *Aconiti Folia* and *Aconiti Radix*, the leaves and the root of *Aconitum napellus;* and the British Pharmacopœias now accord with it, in acknowledging only Aconitum napellus. It belongs to SEXUAL SYSTEM, Polyandria Trigynia; NAT. ORD. Ranunculaceæ; is indigenous in Europe, where it is often cultivated in the gardens, and is seen occasionally in those of this country. The leaves are usually collected when the flowers begin to appear, or shortly before.

Neither the leaf nor the root of aconite has any smell; but when chewed, they slowly occasion a strange sense of tingling and numbness in the tongue and interior of the mouth. The root is gathered in the spring, just before the leaves appear. The expressed juice, as well as the alcoholic extract of the leaves, possesses all the properties of the plant. The watery extract is regarded as a precarious and very irregular preparation. Aconite yields, on analysis, a peculiar alkali termed *Aconitia* or *Aconitina*, and a volatile acrid principle, which is readily decomposed.

It is an active poison of the acro-narcotic class, producing, in small doses, the tingling and numbness already mentioned, and in larger doses, symptoms of gastric irritation, accompanied or followed by signs of narcosis—as stupor, convulsions, coma, and death. From observations by Dr. Richard Eades, the following were the most marked phenomena exhibited by animals to which it had been given: weakness; staggering; gradually increasing insensibility of the surface; slowly increasing weakness of the voluntary muscles ending perhaps in paralysis; great languor of the pulse; more or less blindness, and convulsive twitchings before death. Small and repeated doses of the alcoholic tincture of the root, taken internally, are said to cause a sensation of heat and tingling in the extremities, and occasionally slight diuresis. Unlike belladonna and stramonium,—when applied to the eye, it induces contraction of the pupil; and the powers of the circulation appear to be depressed by it.

Störck of Vienna first urged this remedy, as well as others of the class, on the notice of physicians, and it was employed in numerous diseases; the chief of which were rheumatism, gout, scirrhus, and cancer. Owing to its sedative influence on the circulation, it has been given in hypertrophy of the heart.

Experiments have been made by Dr. Fleming to determine accurately its action. From a consideration of its effects on the circulation, he deduces the following inferences—*First.* That it is a powerful antiphlogistic. *Secondly.* That it is calculated to be of great value in all cases where there is inordinate activity of circulation. *Thirdly.* That it is contra-indicated when there is obvious mechanical impediment to the passage of the blood, particularly through the heart or lungs: and—*Fourthly.* That it is contra-indicated wherever there is irritability of the circulation with great diminution of power, such as occurs after severe venous hemorrhage.

These inferences apply, however, to sedatives in general. It would appear to be a remedy of great power, and ought to be administered with exceeding caution.

In neuralgia, it has been extravagantly praised by some: a single application of the tincture, it is said, produces amelioration, and a few applications an entire cure. It must be admitted, however, that it often fails—as often, indeed, as any other narcotic. In rheumatic affections, it has also been of service. Those of the chronic kind have been most benefited; but cases of acute rheumatism have likewise been greatly relieved. It has, also, been largely employed *externally.* The dose of the powder is one or two grains, which may be gradually increased until its effects are apparent. When good, it causes the tingling and numb sensation before described.

Of the preparations of aconite Dr. Eades thinks the tincture of the root, and the alcoholic extract are most to be depended upon. His observation induces him to regard the alcoholic tincture of the root to be stronger than that of the leaves.

TINCTURA ACONI'TI FOLIO'RUM, TINCTURE OF AC'ONITE LEAVES.—(*Aconit. fol.* ℥iv; *Alcohol. dilut.* Oij: prepared either by maceration or by displacement.) The dose of this preparation is five or ten drops, given three or four times a day; but its effects should be carefully watched. Dr. Male, of Birmingham, England, took tincture of aconite for four days, beginning with five-drop doses, either twice or thrice a day, and increasing the dose to six, eight, and ten drops, so that on the evening of the fourth day he had taken a dose of ten drops. On the morning of the fifth day, the injurious effects of the remedy on the nervous system appeared; and he died on the morning of the seventh day.

It is, applied, as an embrocation, in neuralgia and rheumatism, by means of a small piece of sponge attached to the end of a stick. Dr. Pereira states, that the use of an aconite plaster, made by spreading the soft alcoholic extract on adhesive plaster, in neuralgia, has been suggested to him.

TINCTU'RA ACONI'TI RADI'CIS, TINCTURE OF AC'ONITE ROOT.—(*Aconit. rad.*

contus. ℔j; *Alcohol.* Oij. Prepared either by maceration or displacement.) Dose twenty or thirty drops. A saturated tincture is often used, which is much stronger than the officinal, and has to be administered with caution.

EXTRACT'UM ACONI'TI, EXTRACT OF AC'ONITE.—(Prepared by bruising fresh *aconite leaves* in a stone mortar. Sprinkling on them a little water; expressing the juice, and, having heated it to the boiling-point, straining and evaporating to the proper consistence.) When properly prepared, this extract is of a yellowish-brown color, disagreeable narcotic odor, and has the acrid taste of the plant. The dose is one or two grains in the day, to be gradually increased until its effects on the nervous system are apparent.

EXTRACT'UM ACONI'TI ALCOHOL'ICUM, ALCOHOL'IC EXTRACT OF AC'ONITE.—This is made by distilling off the alcohol from the tincture of aconite, until the extract has the proper consistence. The ordinary dose is one-sixth of a grain, made into a pill with crumb of bread. It has been given to a greater extent in articular rheumatism,—half a grain every two hours, gradually augmenting the dose.

AN AMMONIATED EXTRACT OF ACONITE has also been advised to be applied externally by Dr. Turnbull. It is made by evaporating very carefully, and at a low temperature, a tincture of the dried root of the plant to the consistence of an extract; adding to every drachm of this eight or ten drops of liquor ammoniæ, and allowing the mixture to stand a short time in a very gentle heat, to drive off the excess of ammonia. It is used in the form of ointment, composed of one drachm of the *ammoniated extract* to three drachms of *lard.* When this ointment is rubbed upon the skin, it occasions a pungent sensation like that produced by aconitia ointment. In less severe cases, Dr. Turnbull advises the application of a simple saturated tincture of the dried roots, with or without the addition of a little ammonia. An ointment of the simple alcoholic extract is sometimes used, composed of one part of the *extract* to two parts of *lard.* It may be spread on adhesive plaster.

ACONIT'IA, ACON'ITINE.

The active principle of Aconitum has been brought forward with overstrained eulogies, of late years. They have been sufficient, however, to occasion a formula for its preparation to be introduced into the last edition of the Pharmacopœia of the United States. This consists in exhausting *aconite root* by means of *alcohol;* distilling off the spirit until the extract remains; dissolving this in water, and filtering; evaporating the solution to the thickness of syrup; adding *dilute sulphuric acid,* mixed with distilled water to dissolve the aconitia; next dropping in *solution of ammonia,* and dissolving the aconitia thrown down in *dilute sulphuric acid,* mixed, as before, with water; adding *animal charcoal,* and shaking; lastly, filtering and dropping in *solution of ammonia* to precipitate the aconitia, which is finally washed and dried.

This substance, in powder, is of a white color, with a yellowish tinge; inodorous, and of a bitter taste, leaving behind it an acrid but not burning sensation in the throat. It is uncrystallizable, and requires one hundred and fifty parts of water at the ordinary temperature to dissolve it; but only fifty of boiling water.

Aconitia is a virulent poison,—said to be the most so known, not even excepting hydrocyanic acid,—one-fiftieth of a grain, prepared by Mr. Morson, endangering the life of an individual. According to Dr. Pereira, it produces contraction of the pupil, when applied in a minute portion mixed with lard to the eye; but according to Geiger and Hesse, dilatation of the pupil is the consequence. When a small quantity, either made into an ointment, or dissolved in alcohol, is rubbed for a minute or two on the skin, a sensation of heat and prickling is experienced, to which succeeds one of numbness and constriction in the part, that lasts from two or three to twelve or more hours, according to the quantity rubbed in. So small a portion as the hundredth part of a grain has produced a sensation, which has continued a whole day. Dr. Turnbull found, that unless these peculiar impressions were caused by the aconitia, no benefit whatever was to be expected from it; and he observes, that if there be the slightest abrasion of the skin, an application of such activity should not be resorted to, and that it should be carefully kept from coming in contact with any of the mucous membranes. The diseases in which it has been chiefly used are of the neuralgic kind; and the gouty and rheumatic. It is applied either in *solution in alcohol*, in the proportion of a grain or more to a drachm; or of *ointment* made by rubbing two grains of aconitia with six drops of alcohol, and mixing this well with one drachm of lard. A small portion of this may be rubbed on the affected part, until either the pain is relieved, or the peculiar sensation described above is induced. The application may be repeated three or four times a day if requisite.

Aconitia has nearly gone out of use. The extravagance of the price,—at one time, in England, 3*s*. 6*d*. or upwards of three quarters of a dollar per grain; and, in this country, $4 50 the drachm—would, indeed, have limited its employment, had it been more advantageous than it has proved to be. It would appear, that all its powers are possessed by the tincture of aconite, or by the alcoholic extract.

A spurious aconitia—according to Dr. Pereira—has been found in the shops. It is imported from France, and bears the stamp and label of a celebrated French chemical firm. Its color is grayish-yellow, and it is said to be inert, or nearly so.

8. LACTUCA'RIUM.

Lactucarium is the inspissated juice of *Lactuca sativa, Lettuce;* Sex. Syst. Syngenesia Polygamia Æqualis; Nat. Ord. Compositæ —a plant whose native country is unknown; but which is supposed to be indigenous in the East Indies, and is cultivated in every part of the civilized world. Before the flower-stem shoots up, the plant abounds with a bland milky juice; and afterwards with one that is intensely bitter and milky. When incisions are made in the flowering stem, the juice exudes; and when collected and dried it constitutes LACTUCARIUM, *Thrid'ace* or *Lettuce opium*. The ancients were well acquainted with the soporific virtues of the common garden lettuce; but Dr. J. R. Coxe, of Philadelphia, appears to have first proposed the employment of the inspissated juice in medicine.

There are three kinds of lactucarium. The *first*, the best and most costly, is obtained from incisions made in the stalks as mentioned above, whence the juice exudes, which is dried in the air. This preparation has a bitter taste; soon becomes of a brown color, and solid; has a gummy fracture; absorbs moisture from the air, and becomes soft and clammy. The *second* is obtained by expression of selected stalks, and subsequent evaporation, either in the air or by artificial warmth. This is said to be the variety most commonly met with on the European continent. The *third* is prepared, in the same manner as any common extract, from every part of the plant. This is the *Thridace* of some. The first is the only one worthy the attention of the therapeutist.

Lactucarium has been several times subjected to analysis; but with no great advantage to pharmacology. Neither morphia nor narcotin has been found in it.

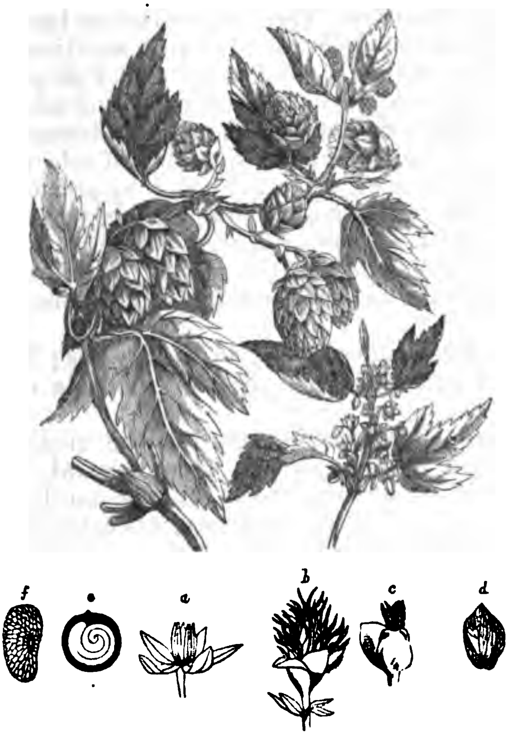
The results of the author's experience in regard to the medical properties of lactucarium have been negative. They certainly do not enable him to say, that it is possessed of the sedative and hypnotic powers that have been assigned to it. By many, it is conceived to be adapted for cases in which opium disagrees, and especially for allaying the cough of phthisis, and other pulmonary affections. Being devoid of any exciting property, it has been given unhesitatingly when the patient was at the same time laboring under increased vascular action. The usual dose is from gr. iij to gr. v; but it has been given to the extent of several drachms a day, without any very marked effect. There can be no doubt, indeed, that its virtues have been greatly exaggerated. As in the case of every anodyne and hypnotic, the dose should be increased until the desired effect is induced. It has been applied externally in conjunctivitis, in the quantity of four grains to the ounce of water; and, like other narcotics, has been formed into a plaster.

LACTUCA VIROSA, *Strong-scented Lettuce* of Europe, as well as L. SCARIOLA, possesses properties analogous to those of L. sativa. It is affirmed, indeed, that the former yields a much larger quantity of lactucarium, and of superior quality. LACTUCA ELONGATA, *Wild Lettuce*, which is common in this country, was orginally introduced into the secondary list of the Pharmacopœia of the United States, as a substitute for Lactuca virosa of Europe. The extract prepared from it is said to be anodyne and hypnotic, in the dose of gr. v to gr. xv.

9. HU'MULUS.—HOPS.

Hops are the strobiles of *Humulus Lupulus*, *Hop plant*; SEX. SYST. Diœcia Pentandria; NAT. ORD. Urticaceæ, which is indigenous in the United States and in Europe, and flowers from June to August. It is extensively cultivated in this country, and chiefly in New England. The cones or strobiles constitute the hops of commerce, which are gathered in England in September, and dried in kilns. They have a peculiar smell, and an aromatic intensely bitter taste—the aroma being lost in process of time, but the bitterness continuing. The bitter taste and the aroma reside chiefly in the lupulinic glands or grains, **LUPULI'NA** or **LU'PULIN** of the Pharmacopœia of the United States, which forms about a sixth part of the weight of dried hops, and may be separated by thrashing, and to which Dr. Ives considers that the hops are indebted for all their medical virtue. These grains are of a cellular texture, and golden yellow color. Unless carefully dried, they soon lose their taste and smell; and the aroma is always impaired by keeping.

Fig. 92.



Humulus Lupulus.

a. Male flower. *b.* Female do. *c.* Sepal or bracteole. *d.* Bract. *e.* Embryo. *f.* Lupulinic gland.

Lupulin, on chemical analysis, yields about 2 per cent. of volatile oil of hops; upwards of 10 per cent. of bitter principle of hops, *Lupulite*, and 50 to 55 per cent. of resin. The scales afford but very little lupulin. Both they and the lupulin yield their virtues to water; but still better to alcohol—pure or diluted.

The emanations from hops are generally considered to possess hypnotic properties; hence a hop pillow is sometimes used to invite sleep. It was directed in the case of George the Third of England, when he was affected with insanity; and came, on that account, much into use. Dr. Pereira states, that he has several times seen a pillow of hops promote sleep; but the author has not been able to arrive at this conclusion. He has often directed it, and sleep occasionally supervened; but he has not been able to decide that it was not induced either in consequence of the effect of the imagination, or independently of the hops. The different preparations of hops and of lupulin are certainly most unsatisfactory narcotics, and by no means to be depended upon. Their bitter principle renders them valuable tonics; and hence their use in ale and beer, as well as to communicate a pleasant aromatic flavor, and to check the acetous fermentation. Beer is, accordingly, prescribed as a tonic and nutritive drink in many cases. Hops are also used externally in the way of fomentation, in painful affections of an internal or external character. A dry hop poultice is often applied in internal affections of the abdomen—the hops being sewed up in a flannel bag, heated and placed over the inflamed part. An ointment composed of powdered hops and lard has also been used in cancerous sores. Lupulin may be added to poultices, or formed into ointment, and be applied in the same cases.

INFU'SUM HU'MULI, INFU'SION OF HOPS.—(*Humul.* ℥ss; *Aquæ bullient.* Oj.) The dose of this *hop tea*—which is rarely used, however—is f℥j to f℥ij. An infusion of double this strength, has been recommended as an antiperiodic,—the whole being taken during the apyrexia.

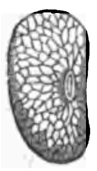
TINCTU'RA HU'MULI, TINCTURE OF HOPS.—(*Humul.* ℥v; *Alcohol dilut.* Oij.) This preparation has been proposed as a substitute for laudanum when the latter disagrees; and the condition of disease, to which it has been considered best adapted, is the wakefulness, attended with tremors and general nervous derangement, to which habitual drunkards are liable, and which frequently precedes an attack of delirium tremens. The dose is from fʒss to f℥iij.

LUPULI'NA.—LU'PULIN.

Lupulin may be given in the same cases as hops, in the dose of gr. vj to gr. xij, made into pills by being rubbed in a warm mortar until they acquire the proper consistence.

It has been extolled by Dr. Wm. Byrd Page, of Philadelphia, as an antaphrodisiac. He has employed it to prevent painful erection in gonorrhœa and syphilis, and after the operation for phimosis. In spermatorrhœa, it prevented the occurrence of nocturnal emissions, so long as the patient was freely under its influence. Dr. Page cites the testimony of Dr. F. G. Smith and Dr. Edward Hartshorne, in confirmation of its antaphrodisiac virtues, and others have testified to the same. The quantity he prescribes is from 5 to 10 grains in powder or pill, to be repeated as occasion may require. The latter dose rarely needs repetition during the night. It causes no headache, constipation, nervousness, nor any other unpleasant consequence.

Fig. 93.



Dried lupulinic grain with its hilum: (magnified). (Pereira.)

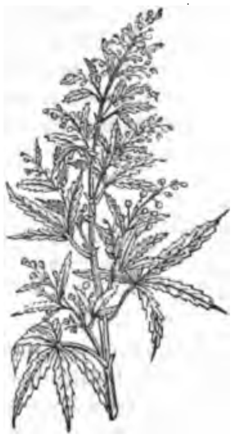
TINCTU'RA LUPULI'NÆ, TINCTURE OF LU'PULIN.—(*Lupulin.* ℥iv; *Alcohol.* Oij.) The dose of this preparation is fʒj or fʒij in sugared water, or any mucilaginous fluid.

10. EXTRACTUM CAN'NABIS.—EXTRACT OF HEMP.

The term "Indian Hemp" has long been appropriated in the United States to Apocynum cannabinum; but the name having been assigned to the hemp raised in India, occasion has been given in

Europe and in this country to confusion as regards the two articles. Although the epithet "Indica" has been applied to the Cannabis of India, it does not appear to possess any specific difference from common hemp—*Cannabis sativa*,—and accordingly, by most botanists, they are esteemed to be identical. It belongs to Sex. Syst. Diœcia Pentandria; Nat. Ord. Cannabinaceæ.

Fig. 94.



Cannabis sativa.

Its narcotic powers have been long known to the people of Southern Africa, South America, Turkey, Egypt, Asia Minor, India, and the adjacent countries of the Malays, Burmese, and Siamese, by whom it is used in various forms to induce intoxication. It is also employed extensively in popular practice in different diseases. In certain seasons, a resinous juice exudes and concretes on the leaves, slender stems, and flowers. This constitutes the *churrus* of Nipal and Hindostan, and in it reside the powers of all the preparations of hemp. This resin, *cannabin, haschischin*, is very soluble in alcohol and ether, and partially so in alkaline solutions, but insoluble in acid solutions. When pure it is of a blackish-gray color; is hard at 90° of Fahrenheit, but softens at higher temperatures, and fuses readily. It is soluble in the fixed and in the several volatile oils. Its odor is fragrant and narcotic; taste slightly warm, bitterish, and acrid. The dried hemp plant, which has flowered, and from which the resin has not been removed, is called *Gunjah* or *Haschisch*. It yields to alcohol twenty per cent. of resinous extract, composed of the resin—*churrus*—and green coloring matter. Gunjah is used for smoking. The largest leaves and capsules, without the stalks, constitute *Sedhee*, *Subjee*, or *Bang*, which is used to form with water an intoxicating drink. *Haschisch* of the Arabs consists of the tops and tender parts only of the plant, collected immediately after inflorescence and simply dried. When the plant is distilled with a large quantity of water, traces of volatile oil pass over, and the distilled fluid has the powerful narcotic odor of the plant.

The medicinal extract of resin, of the Pharmacopœia of the United States, is made by evaporating a tincture of the dried tops.

Although the Indian, the European, and the American plants appear to be botanically the same, they are possessed of very different powers. The former alone seems to have any activity. Mr. Donovan has experimented fully with hemp raised by himself, and has become satisfied, that "domestic hemp is proved to be destitute of the principle, which renders the Indian plant so desirable an excitant to the voluptuous people of the East."

Dr. O'Shaughnessy, who first made extensive trials with it, noticed that the general effects observed on man were alleviation of pain in most cases; remarkable augmentation of appetite; aphrodisia and great mental cheerfulness. The more violent effects were a peculiar form of delirium, and a cataleptic state. Under the influence of fourteen grains of the resinous extract, taken at bedtime during an attack of neuralgia, Mr. Donovan awoke early in the morning with a rush of strange sensations through his head, accompanied by a crackling and singing noise, and a vibratory motion through his whole body. These gradually subsided, and whilst "dozing off," he thought an explosion took place in his head, followed by the same rushing noise and vibration as before; and afterwards by a strange metallic sound. Various other noises succeeded. His sense of touch and feeling had gradually become more and more obtuse, until at length he lost all feeling, unless he pinched himself severely. "The effects," says Mr. Donovan, "were now at their height, and the consequences were surprising. I absolutely lost the consciousness of having a body, and my corporeal existence appeared to be comprised within the head, and a small portion of my chest near the throat: in these spots I felt as much alive as ever, but all other parts were without feeling, and to my perceptions annihilated. My intellect was not in the least disturbed; memory was as good as ever. I reasoned well enough; was conscious of external objects as in perfect health; but I had some notion that if I gave way to sleep, I should never awake in this world; yet, strange to say, I felt perfectly resigned to this sudden termination of existence."

Similar anomalous phenomena were observed on his own person by an eminent physician of Philadelphia from a much smaller dose of the extract.

Possessed of such powers, Cannabis suggested itself as a remedy in various diseases. In cases of hydrophobia, its soothing influence has been manifested; but the testimony is strongest in regard to its efficacy in tetanus. Dr. O'Shaughnessy gives the results of 14 cases of the traumatic form, of which nine appear to have recovered; and from which he concludes, "that in the hemp the profession has gained an anti-convulsive remedy of the greatest value." The results, however, of different observers are by no means in accordance. Whilst some believe it capable of replacing opium, where opium disagrees; others have found it fail where opium had failed. Dr. Lawrie, of Glasgow, has reported its effects in twenty-six cases, from which he draws the following conclusions. "*First.* It seems to belong to that class of narcotics, which rapidly induce excitement and intoxication, followed by sleep, neither sound nor refreshing. *Secondly.* In a full dose it acts powerfully on the heart, causing palpitations, and rapid, weak, intermittent pulse; and on the nervous system producing delirium, coma, convulsions, and dilated pupils. *Thirdly.* Its effects are generally transitory. In one case, however, the intoxication and dilatation of the pupils lasted nearly 48 hours. *Fourthly.* It is a very uncertain agent; in some cases producing the most violent and seemingly dangerous symptoms; in others, being nearly inert. *Fifthly.* It very frequently causes vomiting, which, whether it occur spontaneously or from emetics, very speedily relieves its unpleasant and perhaps dangerous effects. *Sixthly.* Applied around the eye it does not dilate the pupil. *Seventhly.* It exerted little influence on the few patients to whom it was given in the form of enema. *Eighthly.* I do not think it is a valuable addition to our narcotic medicines. In very few instances did it act as an agreeable soporific and anodyne; in none did it succeed when opium had failed; and in one case only was it preferred to opium. I do not think it is to be trusted to. *Ninthly.* So far from acting generally as an anodyne, its effect was so disagreeable, that the majority of those who took it once, only did so a second time on compulsion; and this is the more remarkable, as the patients on whom I experimented belong to a class to whom stimulants of all kinds are familiar, and who would greedily swallow opium and spirits to an unlimited amount. *Tenthly.* It seemed useful in two cases of subacute rheumatism; and *lastly.* It caused an immediate craving for food, and, in a few, permanently increased the appetite."

Professor Miller, of Edinburgh, believes Cannabis to be comparatively valueless as an anodyne, as well as hypnotic, in ordinary circumstances. Its virtue seems to him to consist in a power of controlling inordinate muscular spasm, which it exhibited in a case of traumatic tetanus reported by him. Many cases have been published in which its anti-convulsive power was confirmed.

On the other hand, Dr. Clendinning has no hesitation in affirming, that, in his hands, its exhibition has, usually, and with remarkably few substantial exceptions, been followed by manifest effects as a soporific or hypnotic in conciliating sleep; as an anodyne in lulling irritation; as an antispasmodic, in checking cough and cramp; and as a nervine stimulant in removing languor and anxiety, and raising the pulse and spirits: and these effects have been observed in both acute and chronic affections; in young and old; male and female. Dr. Corrigan believes, that its action is primarily on the motor nerves; its influence, he inclines to think, being transmitted along these to the sensorium and nerves of sensation,—a view which scarcely has physiology in its favor, as it is not easy to understand how an efferent nerve can convey an impression to the sensorium. He found its effects to be very variable. Whilst in a lady, who had long suffered from neuralgia of the face, neck and head, twenty drops of the tincture caused temporary loss of power in almost all the muscles, followed by sleep. A similar dose was taken by other patients three times a day, for weeks, with impunity and advantage.

Messrs. Ballard and Garrod state, that when the dose was large, they observed the urine acquire an odor something like that evolved when the tincture is mixed with water, and in part like that of the Tonquin bean.

The form in which Cannabis is usually given is the ALCOHOLIC EXTRACT, which is by no means of uniform strength or action. The author has known all the effects induced by half a grain; and occasionally very anomalous phenomena are caused by a quarter of a grain; whilst in the spasmodic neuroses, ten or twenty grains of the extract of the shops are often needed. It may be made into a soft pill, and thus swallowed,—or be chewed by the patient, and repeated according to the effect. A TINCTURE may be made of 24 grains of the *extract* to a fluidounce of *dilute alcohol.* Of this, a fluidrachm may be given in tetanus, every half hour, until the paroxysms cease, or cataleptic phenomena are induced. In cholera, Dr. O'Shaughnessy found ten drops given every half hour check the vomiting and purging, and bring back warmth to the surface; and MM. Aubert, Roche, and Chaniac have extolled it in the same disease. In his *Annuaire de Thérapeutique* for 1849, M. Bouchardat refers to the case of M. Willemin, sanitary physician in Egypt, who owed his safety in an attack of cholera to the tincture, in the dose of from 10 to 15 *centigrammes* (gr. 1·54 to 2·31). Dr. Churchill, of Dublin, has prescribed in many cases of uterine hemorrhage the tincture of the resin with the best effects, in the dose of five drops three times a day, increasing it in a few cases to ten, but seldom more. The effects were very soon seen, generally in twenty-four or forty-eight hours; often much sooner. In some cases, indeed, mentioned to Dr. Churchill by professional friends, they appeared to be instantaneous. It is proper, however, to remark, that there are few diseases in which the effects of remedies are traceable with more difficulty; as after a time the discharge generally ceases under any treatment based on general principles.

11. ÆTHER.—ETHER.

Ether, *Sulphuric Ether*, described under EXCITANTS, has long been employed as a narcotic, and when administered in large doses is a decided narcotic poison. It is rarely, however, exhibited as a narcotic in the liquid state; but is at the present day much used in the way of inhalation to induce the aggregate effects to which the name *Etherization* has been given,—that is, more or less suspension of the intellectual manifestations, sensation, and motion.

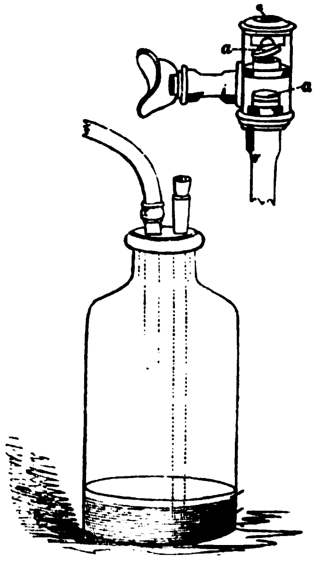
It produces insensibility to pain, and with this view is largely employed by the surgeon, obstetrician, and dentist, as well as by the physician in the various neuroses in which there is much suffering.

Although it has been long known, that the inhalation of ether would cause exhilaration and intoxication when breathed from a bladder, a practice which—as the author has been informed—was a popular diversion, thirty or forty years ago, in this city (Philadelphia), it was not until the latter part of the year 1846, that it was brought forward as an anæsthetic in surgical operations. At the Massachusetts General Hospital, its merits were tested by Drs. Warren and Hayward; and the results being satisfactory, the trials were soon repeated there and elsewhere in this country, and abroad, and very speedily etherization came to be considered as one of the greatest gifts presented by science to humanity. The mode in which its effects, as well as those of chloroform, are produced, has been referred to in the general remarks on anæsthetic agents at the commencement of this chapter. Wherever a powerful sedative dose of a narcotic is needed, the inhalation of ether can be had recourse to with advantage.

In serious operations it not only deadens pain, but prevents the depressing influence which pain is apt to occasion,—and the "shock" that is frequently of so serious a character. It is an excellent remedy, as already remarked, in the various neuroses, in the paroxysms of neuralgia especially,—in asthma, hiccough, in the intense suffering that attends the passage of biliary or urinary calculi, in dysmenorrhœa, &c.

It is needless to enumerate all the cases in which the surgeon can employ it with advantage:—suffice it to say, that wherever pain has to be relieved, or muscular effort counteracted, it can be had recourse to.

Fig. 95.



Inhaler for diffused vapors.

The obstetrician employs it to relieve the pain that accompanies severe labor,—experience appearing to have shown that whilst it accomplishes this, and aids in the relaxation of the parts, it does not diminish the parturient efforts.[1]

Various forms of inhaling apparatus have been devised; but none of them perhaps are necessary. The marginal figure represents a good form for the purpose of administering diffused vapors by inhalation. It has also been employed for inhaling the vapor of ether. The ether is allowed to float on the surface of some water at the bottom of the bottle, and the vapor, having diffused itself in the air above, is inhaled through the bent tube to the end of which the valved mouth-piece is attached. The latter is intended to prevent the expired air from passing into the apparatus. The valves *a* and *a* are two disks of glass, each resting on a short piece of tube, and the whole contained in a larger tube, the opening to the mouth-piece being midway between the two valves. On inspiring, the lower valve opens and the upper one remains closed: on expiring, the lower one is closed, and the upper opens, allowing the expired air to pass out through the orifice *c*.

An apparatus, similar in principle to this, is the one represented in Fig. 96. To promote a more rapid vaporization and diffusion of the ether, a more extensive evaporating surface is required: this is effected by introducing into the bottle pieces of sponge wetted with ether. The straight tube, through which the air enters the apparatus, is provided with a stopper by which the loss of ether is prevented, when the apparatus is not in use.

It is needless, however, to describe the various forms of apparatus that have been devised, as they are all unnecessary. The vapor is most conveniently inhaled from a soft sponge, hollowed out on one side to receive the projection of the nose, and saturated with the purest ether. The sponge, thus prepared, is applied over the nostrils, through which the inhalation must be made, leaving the mouth free to receive atmospheric air, and thus prevent the danger of asphyxia.

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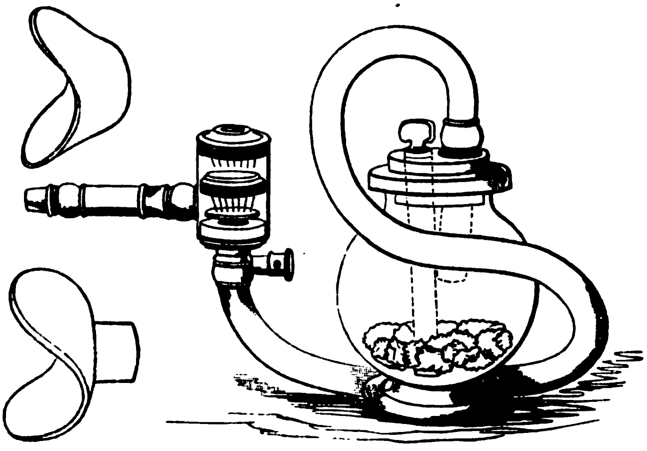
[1] For a detail of the various cases in which ether has been employed as an anæsthetic, see the author's *New Remedies*, 7th edit. p. 82, Philad. 1856.

Fig. 96.



Ether Inhaler.

The time required to produce etherization is generally from two to five minutes. "The quantity"—says Dr. J. C. Warren—"we have generally found necessary has been about two ounces; yet, as already stated, we are not to be guided by the quantity of ether consumed, but by its effects on the patient. After careful inspection of two hundred cases of both sexes, of all ages, in a great variety of conditions of health and disease, etherized through a sponge without reference to quantity, we have seen no immediate or consequent symptoms, which would lead us to embarrass the patient and the surgeon with a complex apparatus."

12. CHLOROFORMUM.—CHLOROFORM.

Various methods for preparing this important agent are given by the author elsewhere. (*New Remedies*, 7th edit. p. 211, Philad. 1856.) The most fragrant article is obtained by the action of chlorinated lime on alcohol. The process recommended by Dr. Christison is the following. One pound avoirdupois of bleaching powder, with three pounds of water, and three ounces of rectified spirit, yields, by distillation in a roomy vessel, about nine fluidrachms of crude chloroform of the density 1·220. After this the residuum begins suddenly to froth up. The crude chloroform, which is covered in the receiver by a stratum of weak spirits, is purified by shaking with it half its volume of sulphuric acid gradually added; and water and alcohol being thus removed, the strong chloroform is freed of a little sulphuric acid by re-distilling it from milk of lime or baryta. The product, which is pure chloroform, if the process be well conducted, amounts to about half a fluidounce.

The process admitted into the last edition of the Pharmacopœia of the United States (1851), is similar, and as follows. Take of *chlorinated lime*, ten pounds; *water*, three gallons and a half; *alcohol*, two pints. Mix the chlorinated lime first with water, and then with the alcohol, in a distillatory vessel having the capacity of about six gallons. Distil with a brisk heat into a refrigerated receiver, and, when the temperature approaches to 176° withdraw the fire in order that the distillation may proceed by the heat received solely from the reaction of the materials. When the distillation slackens, hasten it by a fresh application of heat, and continue to distil until the liquid ceases to come over with a sweet taste. Separate the heavier layer of liquid in the receiver from the lighter, by decantation, and having washed it first with water, and then with a weak solution of carbonate of soda, agitate it thoroughly with powdered chloride of calcium, and distil by means of a water-bath, stopping the distillation when eleven-twelfths of the liquid have come over. The residue, together with the light liquid of the first distillation, may be reserved for use in a second operation.

Pure chloroform is a colorless liquid; of an agreeable ethereal odor, and sweetish taste. Its specific gravity varies, according to the process employed; that of the Pharmacopœia of the United States is 1·49; of the London 1·48; and of the Dublin, 1·496. It is often adulterated, and generally by alcohol or ether; which are detected by the reduction of density, or by its becoming opaline when dropped into water. When pure chloroform is rubbed on the skin it quickly evaporates and leaves scarcely any odor.

Its medical properties are like those of sulphuric ether; than which, when sufficiently diluted, it possesses a more agreeable taste, so that it is readily taken by children. As a narcotic it has been given internally in asthma; spasmodic cough; neuralgia; delirium tremens; maniacal delirium; epileptic convulsions; cancer; uterine irritation; hysteria; chronic vomiting from nervous causes, such as that which occurs in pregnancy; flatulent colic; lead colic; to allay the insomnia and nervous irritation of fever, and in short, wherever sulphuric ether has been found of service. Combined with tincture of camphor and tincture of opium and repeated at short intervals, Dr. Henry H. Hartshorne, of Philadelphia, found it produced good effects in malignant cholera.

As a sedative and soothing topical application, it has been used in cases of open cancer; in sloughing ulcers; fungoid disease; as a gargle in ulcerated sore throat; a collutory in fœtor oris; an injection for the radical cure of hydrocele; a liniment in neuralgia, or local pains, in which the author has found it a valuable agent dropped on a piece of flannel and applied to the part. The pure article does not irritate the surface; but when it contains alcohol it becomes caustic. It may be given internally in the dose of thirty or forty drops. On Dr. Hartshorne, who took it in the dose of seventy-five drops, it produced general diminution of sensorial power with drowsiness without exhilaration, or acceleration of the pulse. He thinks, as the result of his experience, that a fluidrachm is not more than equal, in hypnotic effect, to thirty or thirty-five drops of laudanum. The author has not found, however, that it could take the place of opium to produce sleep;—sometimes succeeding, but frequently not.

Mr. Tuson, who extolled it, before it was employed in the way of inhalation, as a composing and sedative internal and external agent in various surgical diseases, gave it in the dose of from one to five drops.

But its most interesting application is as an anæsthetic agent in the form of vapor. When inhaled in the dose of 20 or 30 minims from a handkerchief, it speedily occasions a sense of whizzing and pulsation in the head, pleasurable ideas and visions, loss of consciousness or a semi-conscious state, and either soft sleep, tendency to laughter and jocularity, or propensity to incoherent talking or boisterous turbulence. When this state passes off, which usually happens in five or six minutes at the most, there is little or no recollection of what has passed, and no remembrance of pain, although a sense of pain may have been expressed. These phenomena—as Dr. Christison remarks—resemble in nature and variety the effects of the inhalation of nitrous oxide gas. The influence on the heart's action is variable. Dr. Christison states, that the most frequent deviation he has observed is some increase in the frequency, and diminution in the force of the pulse, but often no change is observed. In a large dose—of a drachm for example,—coma rapidly supervenes with complete muscular relaxation; slow and stertorous breathing; upturning and fixation of the eyes; and total insensibility to agents that ordinarily occasion the most intense suffering. The pupils are variously affected, but always contractile. The insensibility may commence in fifteen seconds, and is rarely postponed beyond two minutes if the inhalation be skilfully practised. It usually continues between five and ten minutes, but sometimes for two hours if the inhalation has been kept up by renewing the chloroform from time to time—and generally no unpleasant sensations remain after the prominent effects have passed away.

It is undoubted, however, that disagreeable and even fatal results have followed the use of chloroform, and that it is a less manageable agent, or rather requires more care than ether. Still, it has been most extensively employed by Dr. Simpson, of Edinburgh, and numerous others, without any disagreeable consequences, and with signal benefit. Occasionally, tetanic spasms have been produced by it, and it has suddenly and fatally exerted its poisonous influence on the medulla oblongata. Dr. Christison considers sinking of the pulse as the only really formidable affection, and "this seems a rare occurrence."

It is not necessary to enumerate the affections in which the inhalation of chloroform has been prescribed; for a detail of such affections, see the Author's *New Remedies*, edit. cit. p. 218. It is enough to state, that wherever the inhalation of ether has been serviceable, that of chloroform has been found so. On this side of the Atlantic, the former is more employed, and generally considered safer; whilst in Edinburgh the advocates of the latter are more numerous. "Since its first recommendation by Dr. Simpson"—observes Dr. Christison —"it has been extensively used in this city (Edinburgh) in the way of inhalation, to subdue the sufferings of child-bearing. *Its effect is perfect*, and may be maintained uninterruptedly for many hours without influencing the frequency or force of the uterine contractions, and without any eventual harm. It is only when the deepest coma, with suffocative stertor, is brought on, that the uterine contractions are apt to be arrested for a time; a property which may be taken advantage of to facilitate the operation of turning."

It has been much used in Germany, in cases of pneumonia, and, it is said with advantage;—the vapor of sixty drops being inhaled, for ten or fifteen minutes, every two, three, or four hours, so as not to induce loss of consciousness. Nineteen cases are reported by Dr. Warrentrap, of Frankfort, as having been treated exclusively by chloroform, of which only one proved fatal.

The vapor of chloroform directed to the affected part has proved serviceable in many painful affections, particularly of the uterus. Like the vapor of ether, it has been administered *per anum*.

The dose for inhalation is a fluidrachm, which must be repeated in two minutes if the effect be not induced. Dr. Christison affirms, "that there seems no limit to the safe repetition of it. Dr. Simpson has used eight fluidounces in thirteen hours in a case of labor. The patient experiences least annoyance, and is least apt to show a precursory state of excitement, when a full dose is used at once."

As in the case of the inhalation of ether, various forms of apparatus have been invented. Figs. 97 and 98 represent chloroform inhalers. The former consists of a perforated metallic plate, which is placed over the mouth of the patient, and in front of which is a trough containing a sponge moistened with chloroform. The apparatus answers also for the inhalation of the vapor of ether. The apparatus, Figure 98, is made of basket-work. A sponge, wetted with chloroform, is put into the inner part of the apparatus, and this is covered by a cribriform diaphragm, which intervenes between it and the mouth of the patient. These forms of apparatus are, however, unnecessary: a small muslin or silk handkerchief, twisted into a hollow cone or into the form of a bird's nest, moistened with

Fig. 97.

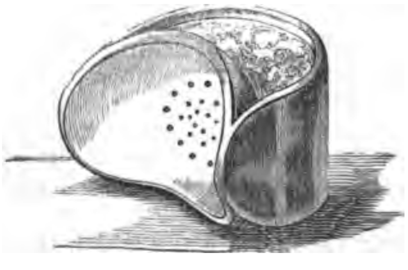
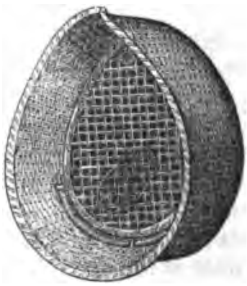


Fig. 98.



Chloroform Inhalers.

chloroform, and held near the nose or mouth of the patient, is the method adopted by Dr. Simpson and other distinguished individuals. In this way, a due admixture of atmospheric air may be insured, and the risk of asphyxia be avoided.

A *spirit* or *tincture of chloroform*, consisting of one-third part chloroform and two-thirds alcohol, has been recommended by Dr. Warren, under the name of *strong chloric ether*, as safer than chloroform and more agreeable than sulphuric ether. It is not much employed. A *compound ether* has also been used, which consists of a solution of chloroform in sulphuric ether.[1]

The vapors of sundry other substances,—of *hydrochloric* and *nitric ethers*, *bisulphuret of carbon*, *chloride of olefiant gas*, *benzin*, *aldehyde*, *light coal tar naphtha*, *amylene*, when inhaled, produce anæsthetic effects analogous to those of ether and chloroform; but they are not much used.

13. SPIR'ITUS ÆTHERIS COMPOS'ITUS.—COMPOUND SPIRIT OF ETHER.

(*Æther.* Oss; *Alcohol.* Oj; *Ol. æther.* fʒiij.) This preparation, which is an imitation of one described by Hoffmann, and hence termed *Hoffmann's Anodyne Liquor*, or *Hoffmann's Mineral Anodyne Liquor*, is regarded by many—as its name imports—to be possessed, in moderate doses, of narcotic powers. In very large doses, like alcohol, it is unquestionably narcotic. Many persons have a high opinion of its anodyne properties, which they are disposed to refer to the oil of wine that enters into its composition. Others believe, that it possesses no other virtues than ordinary sulphuric ether. Certain it is, that little dependence is placed upon it in cases where potent anodynes are indicated; and notwithstanding the authority that has been brought forward in its favor, the author is compelled to say—from the results of careful experiments instituted with it on the sound and the sick—that he has not noticed in it any special anodyne or hypnotic virtue, beyond that which has been induced by the evanescent excitant action of the ethers in general. It may be added, however, to other decided narcotics—as to laudanum—its action preventing the nausea, which occasionally supervenes on the use of the latter.

The dose of the spirit is fʒss to fʒij, in sugar and water.

Besides the preceding narcotics, the following are officinal in the secondary list of the Pharmacopœia of the United States.

14. Ascle'pias Syr'iaca, *Common Silkweed, Milkweed;* Sex. Syst. Pentandria Digynia; Nat. Ord. Asclepiadaceæ. A very common plant in this country; flowering in July and August. The root is officinal, and is said to possess anodyne properties. The dose of the powder is ʒj, given through the day in divided doses. It has likewise been administered in strong infusion. The author has no experience with it.

15. Ly'copus, *Bugleweed, Lycopus Virginicus;* Sex. Syst. Diandria Monogynia; Nat. Ord. Labiatæ; an indigenous herb, is met with in the greater part of the United States; flowering in August. The

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[1] For reference to the special cases in which chloroform has been used, see the author's *New Remedies;* loc. cit.

whole herb is officinal. Its odor is peculiar; taste slightly bitter and nauseous. It readily yields its virtues to water.

Bugleweed is said to be a mild narcotic; allaying irritation and cough, and diminishing the activity of the circulation: hence it has been prescribed in hæmoptysis, and, indeed, in hemorrhages in general. It is given in *infusion*—(*Lycop.* ℥j; *Aquæ bullient.* Oj—Dose, f℥ss to f℥iij) but—like a multitude of other agents—its virtues are scarcely sufficient, perhaps, to warrant its retention in the lists of the materia medica. Some have ascribed to it astringent properties.

16. HAMAME'LIS VIRGIN'ICA, *Witch Hazel.* An indigenous shrub: ORDER, Hamamelidaceæ (Lindley), is considered to resemble Lycopus in its medical properties. A decoction of the bark is chiefly used.

II. TETAN'ICS.

SYNON.—*Spastica, Convulsiva.*

Definition—Modus operandi—Therapeutical application—Special Tetanics.

Between the agents described under the head of NARCOTICS, and those that fall under consideration here, there is a well-marked difference; for whilst the former are anodyne and hypnotic in appropriate doses, the latter—leaving the encephalon untouched—may affect most prominently the nerves of voluntary motion; giving rise to tetanic convulsions, especially in parts which are affected with paralysis; and only in excessive doses induce the ordinary signs of acro-narcotic poisoning. It is in consequence of this effect upon the nerves that are distributed to the muscles, or to the portions of the nervous centres with which they are connected, that this class of agents has been termed, by some recent writers, TETANICS; and, to avoid confusion, the author has adopted it rather than attempt to suggest another appellation, and perhaps one that would not be more expressive. Dr. Pereira has called them also CONVULSIVES, *Spastica*, and has defined them to be—"agents which augment the irritability of the muscular fibre, and in large doses occasion convulsions;" but their action seems manifestly to be exerted upon the nerves, and through them on the muscular irritability. The fact, indeed, that they induce involuntary muscular contractions of the voluntary muscles, from slight twitchings to the rigidity of tetanus, according to the quantity given, is sufficient to demonstrate, that the phenomena, resulting from their administration, are purely nervous, and that their agency is exerted more especially on the nervous system of reflex actions—the ganglionic neurine of the spinal marrow.

They are chiefly given in paralysis, and especially in the local forms;—none of them being well adapted for cases in which the cause of the paralysis is encephalic.

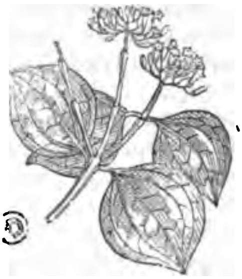
SPECIAL TETANICS.

1. NUX VOM'ICA.

Nux vomica is the seed of *Strychnos Nux Vomica;* SEX. SYST. Pentandria Monogynia; Nat. Ord. Apocynaceæ (Lindley), a middling-sized tree, which is indigenous in Coromandel, and other parts of India, and in Ceylon.

The wood—*Lignum Colubrinum, Snakewood*—is very bitter, and has been employed in the treatment of intermittents; and the bark was for a long time known under the name of *false Angustura* or *false Cusparia bark;* and was at one time referred to *Brucea ferruginea* seu *antidysenterica.* The berry is round, smooth, of the size of a pretty large apple, and covered with a smooth, somewhat hard shell of a rich orange color, filled, when ripe, with a white, soft, gelatinous pulp, containing the seeds. These—as met with in the shops—are circular, and flat, nearly an inch in diameter; concave on one side; slightly convex on the other; and thickly covered with short, brown, satiny hairs. From their resemblance to buttons, they have sometimes been termed *Bachelor's Buttons.* They are devoid of smell; but of an acrid, and very bitter taste, and are reduced to a state of fine division with difficulty. The simplest method is to rasp, or soften them well with steam; and then slice, dry, and grind them. The powder is of a grayish-yellow color; of a faint sweet odor, and an intense, durable bitter taste.

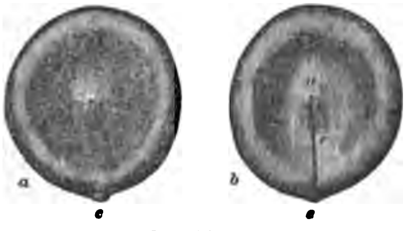
Fig. 99.



Strychnos Nux Vomica.

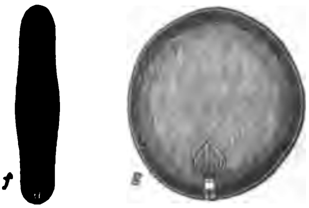
Alcohol is the best solvent; but dilute alcohol, and water take up the bitter active constituents. They have frequently been subjected to analysis; but the results, obtained by MM. Pelletier and Caventou, are considered the most satisfactory. Those gentlemen found them to contain,—strychnic or igasuric acid; strychnia and brucia, in combination with strychnic acid; wax, in small quantity; concrete oil; yellow coloring matter; gum; a little starch; bassorin, and woody fibre. Carbonate of lime and chloride of potassium were in the ashes.

Fig. 100.



Nux Vomica.

Fig. 101.



Sections of Nux Vomica.

The quantity of nux vomica, on which duty was paid in England, in 1840, was, according to Dr. Pereira, 550 lbs.

Nux vomica possesses the power of exciting the ganglionic neurine of the spinal marrow without implicating, otherwise than indirectly, the functions of the brain. The chief diseases in which it is administered, as well as its varied effects in accordance with the dose, are considered under the head of its active principle, STRYCHNIA, with which—in a therapeutical point of view—it may be esteemed identical. It is given in powder, in the dose of five grains, repeated three or four times a day, and gradually increased until the special effects of strychnia on the muscles are perceptible. The greatest objection to this form is its uncertainty; and hence the alcoholic extract, **EXTRAC'TUM NUCIS VOM'ICÆ, EXTRACT OF NUX VOMICA** of the Pharmacopœia of the United States, has been generally substituted. This is prepared by taking any quantity of *nux vomica* rasped; exhausting it by repeated maceration in *alcohol*, and evaporating it slowly to the consistence of an extract. When this extract is given in an overdose, it occasions tetanic convulsions and death; and, in medicinal doses, in cases of paralysis, tetanic convulsions and a feeling of creeping are experienced, which indicate the action of the remedy. Occasionally, it would seem to accumulate in the system, and afterwards explode; death, at times, supervening with distressing cerebro-spinal phenomena; hence it is not always proper in encephalic paralysis. It is, however, in paralysis, general and local, that it is most frequently administered; indeed, in all the cases in which its active principle —strychnia—is given.

The dose of the extract—made into a pill—is one grain, the dose being gradually augmented until the peculiar effects are induced. It may be taken at bed-time, as night affords the best opportunity for noticing the tetanic phenomena. Generally from four to six grains are sufficient; but at times, it is necessary to carry the dose to twenty or thirty grains. Should the administration of the remedy have been interrupted, the patient ought to recommence with small doses, and increase them gradually as before.

M. Pétrequin employs a TINCTURE OF NUX VOMICA, prepared of four ounces of the *powder* and a quart of *brandy*, altogether externally as an embrocation to palsied parts. A LINIMENT, composed of an ounce of the *Tincture of Nux Vomica*, and two drachms of *Liquor Ammoniæ*, is not unfrequently ordered in similar cases.

TINCTU'RA NUCIS VOM'ICÆ.—TINCTURE OF NUX VOM'ICA.—(*Nucis Vomic.* ℥viij; *Alcohol.* Oij. Macerate for 14 days; express, and filter. It may also be prepared by percolation.) Dose, five to twenty drops. It is also applied externally in cases of paralysis.

The seed of STRYCHNOS IGNA'TII, *Igna'tia ama'ra*—a tree inhabiting the Philippine Isles—have the same medical properties as nux vomica. They are the *St. Ignatius's Beans*, *Fabæ Sancti Ignatii*, of the shops, and are remarkable for the large amount of strychnia which they contain. An extract, prepared from them, has been supposed to differ in its effects on the economy from that of nux vomica. Strychnia is, however, the active ingredient; and the difference is probably only in degree.

a. STRYCH'NIA.

This alkaloid was discovered in 1818 by MM. Pelletier and Caventou. It has been found in *Strychnos Nux Vomica*, *S. Ignatia*, *S. Colubrina*, and *S. Tieuté;* and is often associated with brucia, and always with an acid. In the Pharmacopœia of the United States it is directed to be prepared by a process of which the following is the rationale. *Nux Vomica*, rasped, is digested and boiled in two gallons of *water* acidulated with *muriatic acid;* this decomposes the strychnate of strychnia as it exists in nux vomica, and muriate of strychnia is formed. The residuum is boiled again, and again, in *acidulated water*, and the decoctions, after being strained, are mixed and evaporated to the consistence of syrup. *Lime*, previously mixed with water, is now added; and the mixture is boiled for a little while, frequently stirring. This decomposes the muriate of strychnia; and the precipitate is pressed, dried, and powdered. This powder is now treated repeatedly with *boiling alcohol*, until deprived of its bitterness; the liquors are mixed, and the alcohol is distilled off. To the residue water is added, heat applied, and sufficient *diluted sulphuric acid* to neutralize and dissolve the strychnia; purified *animal charcoal* is now added to deprive it of coloring matter; it is then boiled for a few minutes, filtered, and crystallized. The sulphate of strychnia, thus formed, is dissolved in *water* and sufficient *solution of ammonia* added to separate and precipitate the strychnia, which is dried on bibulous paper.

Thus obtained, strychnia is a white powder, of an intensely bitter taste, almost insoluble in water; slightly soluble in cold alcohol, and readily soluble in the same menstruum when boiling. Although almost insoluble in water, it has a powerful bitter taste. A solution made in the cold, and therefore containing only $\frac{1}{8000}$th part of its weight, may be diluted one hundred times, and still retain a very decidedly bitter taste. It has an alkaline reaction, and forms, with acids, salts that are mostly crystallizable, and insupportably bitter, and are more soluble than pure strychnia.

The action of strychnia is precisely like that of nux vomica, for which it is now pretty generally substituted. In adequate doses, it is one of the most energetic poisons, producing death through its lethiferous action on the spinal marrow. A case of the kind, detailed by Dr. Blumhardt, of Stuttgart, is given by the author at length in another work, and others are there referred to. (*New Remedies*, 7th edition, p. 655, Philad., 1856.) Morphia appears to be the best antidote to it.

It is in paralysis that it has been most prescribed; and from the results of numerous observations, it would seem that it is most efficacious in paraplegia; less so in hemiplegia, although it has been given at times with advantage in the latter affection. Its administration in hemiplegia requires, however, special circumspection, particularly when the paralysis has succeeded to apoplexy; as there is reason to believe, that the excitant influence of strychnia has had some effect in inducing a recurrence of the apoplectic condition. It is in local paralysis that it is most serviceable—as in aphonia, amaurosis; paralysis of the bladder, rectum, facial nerve, &c. In colica pictonum, the settled practice of the New York Hospital is said to be—the administration of strychnia in the dose of $\frac{1}{16}$th of a grain three times a day. In high degrees of paraplegia, the internal use of the remedy is sometimes preferred; but the endermic administration is more general. In paralysis of the limbs, a spot is selected in the vicinity of the spine. Nux vomica has been recommended by M. Duclos in impotence and spermatorrhœa. Strychnia has been given in neuralgia, traumatic tetanus, hysteria, hypochondriasis, dyspepsia, chorea, epilepsy, asthma, intermittent fever, and catalepsy; but the author has never seen much, if any, advantage from it in some of these affections. It has been administered, likewise, in dysentery and diarrhœa, and in diabetes; and has been used endermically, as well as internally, in cholera to allay vomiting—from a quarter to half a grain being added to three ounces of water, and this solution given in the dose of a spoonful every hour. A modern writer, Dr. Ryan, asserts, that he has repeatedly known a few of the following pills, check a profuse diarrhœa with rice-colored evacuations, even when the extremities were blue, in malignant cholera. [?] (*Strychniæ* gr. i; *Confect. Ros.* ʒss; *Pulv. Glycyrrhiz.* ℈ss.—M. et divide in pil. xii. Dose, one, night and morning, gradually increased to four or five daily.) From its occasional efficacy in analogous conditions of the digestive mucous membrane, it has been suggested, that it might prove useful in bronchitis.

Strychnia is best given in the form of pill or tincture. The dose is from $\frac{1}{16}$ to $\frac{1}{8}$ of a grain, which may be gradually increased until a grain is taken; or until its peculiar effects upon the muscles are apparent. Should these be too severe, they may be moderated by a dose of opium or morphia. A TINCTURE may be made of *Strychnia* gr. iij; *Alcohol* f℥i; the dose of which is from six to twenty-four drops, twice or thrice a day.

In the endermic application of the remedy, a blister of the requisite size is applied, and a quarter of a grain sprinkled twice a day on the denuded surface—the quantity being slowly increased to half a grain or more, should this be necessary. When used endermically the preparations of strychnia produce much more powerful local effects than those of morphia; they are apt to keep the abraded portions of the skin in an inflamed state, promote suppuration more than morphia, and occasion violent itching and burning, with a feeling as if needles were run into the skin.

When strychnia, administered in larger doses, does not act beneficially in any case, it will be advisable to discontinue the remedy for a few days, after which smaller doses may again exert their influence; rather than to carry the dose still higher. Dr. Christison is of opinion that it is not a cumulative poison; but the author has seen one or two cases, which would favor a contrary view; and Dr. F. A. Gebhard, of Moscow, in consideration of the dangerous effects at times produced by it, thinks that some other agent should be sought for, even in those cases in which it has been found advantageous. Its continued employment in small doses, or its administration in larger, appears to him to cause, in some unknown manner, such a change in the blood, as to result unexpectedly and suddenly in a powerful reaction on the nervous system, marked by convulsions, tetanus, exhaustion, paralysis, and death. Yet he proposes as a substitute one of the most energetic articles of the materia medica,—veratria!

At times, during the endermic use of strychnia, the blistered surface becomes covered with a layer of coagulable lymph, in consequence of which the strychnia does not make its appropriate impression. This layer must be removed, as far as practicable, at each application; and as the vesicated surface becomes daily less and less sensible, the dose must be proportionately increased.

Besides strychnia, several of its salts are occasionally used in medicine; for example, the ACETATE, IODATE, IODIDE OF IODHYDRATE, NITRATE, and SULPHATE. They are given in the same cases as strychnia. A syrup of the sulphate is strongly recommended by M. Trousseau in chorea.

b. BRU'CIA.

From Nux Vomica Bark an alkaloid is separated analogous to strychnia. It is also associated with strychnia in the seeds of nux vomica, and in St. Ignatius's bean; and is combined with igasuric acid. In the bark of nux vomica it is combined with gallic acid. In the preparation of it an ALCOHOLIC EXTRACT of false Angustura bark is first made, which is dissolved in a large quantity of cold water, and filtered to separate the fatty matter. The coloring matter is precipitated by acetate of lead, the excess of which is thrown down by sulphuretted hydrogen gas; and the brucia by an alkaline base, for which purpose magnesia may be employed. The precipitate from the magnesia is washed, dried, and treated with alcohol, which lays hold of the brucia. This is obtained by evaporation.

Pure brucia is of a white color; and is in crystals, which have the form of oblique four-sided prisms. Its taste is very bitter, and it is soluble in 500 parts of boiling water, and in 850 parts of cold. It dissolves readily in alcohol. With the acids it forms neutral salts.

Brucia acts on the economy like nux vomica bark, but more energetically. It is analogous to strychnia in its operation; but much weaker,—in the ratio of 1 to 10 according to M. Pelletier, 1 to 12 according to M. Magendie, and 1 to 24 according to M. Andral. M. Bouchardat, however, considers it to be more active than is generally believed; and M. Bricheteau prefers it to strychnia in old paralyses, the result of apoplexy, on account of the power of giving it in larger doses without fear of unpleasant effects. He never administers it in such cases, until after six months from the apoplectic seizure, under the apprehension, that at an earlier period it might exert a toxical action on the cerebro-spinal system, He prescribes it in the dose of about one-sixth of a grain (*centigramme*); and increases it daily by the same quantity, until its effects are seen. It is scarcely ever used, however. It may be given in pill or in tincture.

2. AR'NICA.—LEOPARD'S BANE.

Arnica—the flowers of *Arnica montana;* Sex. Syst. Syngenesia Polygamia superflua; Nat. Ord. Compositæ—are in the secondary list of the Pharmacopœia of the United States. It is common in the Alps, and is met with in the mountainous parts of the North of Europe. It is said by Mr. Nuttall to be found in the northern regions of this continent to the west of the Mississippi. The whole plant, and especially the root, possesses a peculiar aromatic unpleasant odor, and an acrid nauseous taste. The root yielded, on analysis' by Pfaff, volatile oil, acrid resin, gum, extractive, and woody fibre; and Dr. A. T. Thomson is of opinion, that the igasurate of strychnia exists in the plant.

Arnica, in large doses, belongs to the class of acro-narcotic poisons. In smaller doses, it has been employed, especially in Germany, in paralysis, as an excitant to the nervous system. In this country, however, it is not much used, and there does not appear to be any clear appreciation of the affections for which it is adapted. "It may be concluded,"—say MM. Merat and De Lens,—"that we have as yet insufficient data to pronounce positively on the affections in which the arnica can be unequivocally efficacious: we must consequently always bear in mind its heating and active qualities when we prescribe it."

The *volatile oil of the flowers* has been much prescribed in Germany in old cases of paralysis, the result of the apoplectic condition. Schneider mixes four drops of *arnica oil* with half an ounce of *Hoffman's anodyne liquor* or *spirit of nitric ether;* and of this he gives from four to twelve drops several times a day.

A *tincture of Arnica*, made by digesting about two ounces of the *flowers* in a pint of *diluted alcohol* for four days, has been, of late, much used as a local application in rheumatic pains. It is stated in the Dispensatory of the United States (1851) to have recently come into use in this country as a domestic remedy in sprains, bruises, etc.

The Germans, according to Sir George Lefevre, class arnica among sacred remedies; and its virtues are extolled throughout two pages of the "*Pharmacopœia Ruthensis.*" Sir George himself was much disappointed in its effects. It is much more uncertain than strychnia in its operation; and he has known it exhibited in large doses without producing any sensible results.

3. TOXICODEN'DRON.—POISON OAK.

The leaves of *Rhus Toxicodendron;* Sex. Syst. Pentandria Trigynia; Nat. Ord. Terebinthaceæ, are in the secondary list of the Pharmacopœia of the United States. *Rhus Toxicodendron*, and *Rhus radicans*, *Poison vine*, are mere varieties of the same plant.

The Poison Oak is a shrub from one to three feet in height. It is very common in the United States from Georgia to Canada, flowering in June and July. The juice, which issues from it when wounded, applied to the skin, excites erythematous inflammation and vesication, which, at times, put on the characters of ordinary local erysipelas; at others, of herpes. Nor does it seem to be necessary that the juice of the plant should come in contact with the parts to produce this effect. An acrid volatile principle escapes from them, which causes the mischief. This generally appears soon after exposure, and commonly declines in about a week.

The leaves, when taken internally in large doses, are acro-narcotic. In medicine, their use has been almost restricted to old paralytic cases dependent upon torpor of the nerves,—the same cases as require the use of strychnia,—but they are not much prescribed. The dose, usually given, has been from gr. ss to gr. j; but much larger quantities may be prescribed without inducing its disagreeable excitant effects on the nerves. It is said to induce twitchings of the affected muscles like strychnia.

III. ANTISPASMOD'ICS.

SYNON. *Antispastica.*

Definition of antispasmodics—Spasm considered—No direct antispasmodic—Modus operandi of the indirect mental antispasmodics—Therapeutical application of antispasmodics, in tetanus, chorea, epilepsy, asthma, hooping-cough, colic, hysteria, &c.—Special antispasmodics.

Great discrepancy has existed among therapeutical writers as to the precise situation in which antispasmodics ought to be placed. Dr. Murray classes them, with narcotics, amongst "diffusible stimulants;" whilst Dr. A. T. Thomson places them with these same agents,—as substances that diminish action secondarily. A short inquiry may tend to assign them their proper position. They are usually defined:—"substances that allay irregular muscular contraction;" and Dr. Paris affirms, that there are certain medicinal bodies, which would appear to exert a specific control over spasmodic action, from whatever cause it may have originated: such, he says, are assafetida, galbanum, musk, castor, ammonia, valerian, &c. He properly adds, however, that "in a more general view of the subject, we must admit, that this class branches by indefinable gradation into narcotics and tonics; for since spasm may be connected with the most opposite states of the body, it is very evident, that many of the individuals included in the class of antispasmodics can only be relative agents: spasm, for instance, may arise from excessive irritability, as from teething, wounds, worms, &c., in which case a narcotic would prove beneficial; or it may depend upon a state of general debility, the proper remedy for which would be the administration of an aromatic stimulant, or the assiduous exhibition of some permanent tonic."

It may be affirmed, however, that we are not acquainted with a single article of the materia medica, which acts specifically on the muscular fibre when in a state of spasmodic contraction. That such *may* exist cannot be denied, but at this time we know of none. They may all be regarded as *indirect* agents;—relieving and removing spasmodic action, in consequence of their agency being exerted on other parts of the nervous system than those concerned in the irregular muscular contraction; and thus deriving from the nervous influence concerned in the production of the latter.

In order to thoroughly comprehend this position, it is proper to inquire into the nature of spasm. The Greeks gave the name to every kind of convulsion; and by modern nosologists, convulsions are ranked amongst the '*spasmi.*' The term is now usually applied to involuntary contractions, especially of the voluntary muscles; and these, again, have been divided into *tonic* spasms, when they consist in permanent rigidity of the muscles concerned, of which we have an example in common cramp;—and *clonic* spasms, which consist in alternate contractions and relaxations—of which we have an example in the convulsions of children.

It is now admitted by almost all physiologists, that the muscular fibre, like every primary tissue of the body, is possessed of excitability or irritability,—that is, of a power of being acted upon by appropriate stimuli, and of moving responsive to such stimuli. This *vis insita*, however, absolutely requires that it shall be acted upon by stimuli before motion is produced. The muscular filaments of the voluntary muscles are supplied with nerves from some part of the cerebro-spinal axis, and along these nerves the appropriate stimulus is sent which excites them to contraction. In the case of voluntary motion —as of the biceps to raise a weight attached to the hand, or to the extremity of the forearm—an act of volition is executed, under the influence of which the portion of the cerebro-spinal axis, whence the nerves proceed to the upper extremity, is excited to send the proper nervous influx along those nerves, in quantities strictly in accordance with the extent of action, which the muscles should execute. The fibres immediately contract responsive to the stimulation. Now, if any cause of irritation exist in the cerebro-spinal axis, or indeed in any part of a nerve distributed to a muscle, such irritation may induce the same effect as the act of volition; and the muscle may, in this manner, be permanently or intermittently contracted. In all cases, therefore, spasms appear to be a nervous phenomenon; and remedies adapted for its removal must exert their influence on some part of the nervous system,—not on the muscular fibres, over the condition of which they would not appear to have any control.

They who admit *direct* antispasmodics find that difficulties environ them, the very nature of which entangles the subject in inextricable confusion. Dr. A. T. Thomson—after entering into a long and singularly infelicitous disquisition on the precise *modus operandi* of antispasmodics—suggests as a point requiring consideration, whether they are stimulants or sedatives? and he decides that they are sedatives;—"for," he remarks, "if the irregular or inordinate action, which they overcome, be the consequence of irritation, either mental or corporeal, it follows that, in resolving spasm, the susceptibility of impression in the extreme motor nerves must be diminished; and this can only be the result of a sedative power. It may, however, be affirmed, that this must either be immediate or consecutive of a previous stimulant operation; thence we can explain, why some of those medicines, which can only be regarded as direct antispasmodics, stimulate the general system, and, consequently quicken the pulse; since, like narcotics, this action may be primarily of a stimulant character, and be quickly followed by collapse. According to this mode of reasoning, the same results may follow from antispasmodics operating exclusively on the motor nerves, as from narcotics operating on those of sensation."

Without animadverting on many of the hypothetical positions contained in this extract as to the *modus operandi* of antispasmodics, and the parts on which they specially act, it may be observed, that every difficulty vanishes when we regard the *direct*—for such only can be esteemed *true*—antispasmodics, as acting only by virtue of the new impression which they make on the gustatory or gastric nerves, or both, and thus deriving from the inordinate action going on in some other portion of the nervous system. What, indeed, are the reputed direct antispasmodics?—musk,—castor,—Dippel's oil,—oil of amber,—valerian,—assafetida,—galbanum,—skunk-cabbage,—ethers, &c.;—all substances belonging to the class of excitants, and many of them calculated, in addition, to make a powerful impression on the nerves of gustation, and olfaction;—and what, again, are the *indirect* antispasmodics? Dr. Thomson divides them into *material*, including tonics and narcotics; and *mental*, comprising fear and abstraction. It is strange, however, that he should not have classed bloodletting amongst the material agents, especially as he had previously remarked, with much propriety, that whether the effects of antispasmodics be perceptible very soon after their administration must necessarily depend on the cause of the spasm, "whether it arise from exhaustion and collapse,—such, for example, as occurs from bloodletting when the quantity of the vital fluid abstracted is more than the condition of the system can support, in which case nothing is more common than for syncope to be attended with convulsions; or whether it depend on the opposite state, fulness of the vessels of the brain, sufficient to produce epilepsy, or on some degree of inflammation, as in phrenitis, which is sometimes also attended with convulsions." "It should ever be remembered," he adds, "that although antispasmodics are indicated, and proper in the first state, just described, yet, that this class of medicines is positively injurious, when the spasmodic action is the consequence of inflammation of the brain, or spinal marrow, or their coverings; under such circumstances, bloodletting and measures calculated to subdue the primary disease are the means to be adopted."

One of the great difficulties, indeed, in discriminating the character of different diseases of the convulsive kind, is involved in the consideration, whether they be dependent upon an inflammatory or hyperæmic condition of vessels, or be connected with exhaustion or excessive irritability of the nervous system. In another section, the author has dwelt on everything applicable to this portion of the subject, when considering the effects of the abstraction of blood in such diseases. To that section he must refer the reader. (See SEDATIVES.)

In ordinary cases of spasmodic action, not dependent upon any excited action of vessels, anything that produces a new nervous impression proves antispasmodic. Narcotics do so by blunting the impressibility of the whole nervous system. Nauseous agents produce their effects upon the olfactory or gustatory nerves; and, if they be excitant at the same time, upon the nerves of the stomach. Simple excitants and tonics act on the same nerves, and through them on the general system. Nothing, indeed, could better elucidate the *modus operandi* of these agents than *Fear* and *Abstraction*, which Dr. Thomson has termed MENTAL ANTISPASMODICS. He refers to a striking instance of the sanative effect of fear in hooping-cough kept up by habit. The patient, a young boy, was threatened with the application of a large blister; and although it was not applied, but merely placed within his view, the dread of it completely relieved the cough. Boerhaave is asserted to have cured epilepsy by taking a redhot poker, at the moment of the expected attack, and threatening to push it down the throat if the patient should have a fit. Still more recently, the same remedy has been advised to be directed towards the nether extremity of the body. In a treatise on plague, dysentery, and ophthalmia, Dr. Louis Frank recommends, that a dysenteric patient should be tied hand and foot and be held by two men, when—"*chirurgus cum ferro candenti, figuram coni habenti, coram ægroto compareret, et id versus anum dirigiret, quasi id ano intrudere vellet!*"

All these are cases of the simple revulsive effect of fear; and in this way every mental emotion may prove antispasmodic. Any form, indeed, of abstraction, or rather of distraction, is necessarily revellent, and antispasmodic. When Cato, the Censor, reduced luxations, as he pretended to do, by certain mystic words (p. 67), he diverted the attention of the sufferer; prevented inordinate contraction of the muscles around the dislocated joint, and a slight manipulation only was necessary to reduce it. At the present day, the surgeon is in the habit of employing a similar agency; for, although he may have no faith in set forms of speech, or in cabalistic expressions, he knows that if he can concentrate the attention of the patient, he may lessen the contraction of the implicated muscles, by diverting, in some measure, the nervous influx from them; and if he then suddenly exerts his skill at reduction, the bone will occasionally slip readily into its place.

The same kind of revellent influence is invoked in cases of cramp. In the "Table Talk" of Coleridge, there is an allusion to one of the popular 'charms' for cramp, of which there are so many. "When I was a little boy at the Blue-coat School, there was a charm for one's foot when asleep; and I believe it had been in the school since its foundation in the time of Edward the Sixth. The march of intellect has probably now exploded it. It ran thus:—

"'Foot! foot! foot! is fast asleep!
Thumb! thumb! thumb! in spittle we steep;
Crosses three we make to ease us,
Two for the thieves, and one for Christ Jesus.'

"And the same charm served for a cramp in the leg, with the following substitution:—

> "'The devil is tying a knot in my leg!
> Mark, Luke, and John, unloose it, I beg!
> Crosses three, &c.'"
>
> (*Table Talk*, ii, 33.—American Edit.)

By an analogous agency, the animal magnetizer, and perhaps the mineral magnet, operate their cures; and change of air, society, and scenery exert their good effects in nervous maladies. Certain highly nervous and imaginative persons can feel pains wherever they please, and many an individual, by the perusal of cases of disease, has fancied himself affected with the same sufferings which he has seen depicted. If, then, attention can direct the nervous afflux *to* a part, it is obviously of great moment so to impress the nervous system of the individual, that no concentration of the kind may take place *towards* the suffering organ; and this may be accomplished by engaging the mind on some subject of entertainment or reflection,—by impressing the totality of the nervous system, or by affecting nerves at a distance from those implicated.

The author has before observed, that he does not regard the direct or true antispasmodics, as they have been termed, to be worthy of the name, and that he believes them to produce their effect by the impression they make on the nerves of two of the senses, and by their stimulant properties, which,—in the case of the articles referred to, as *true* antispasmodics,—are dependent upon animal resin, empyreumatic oil, volatile oil, or gum-resin. It has been affirmed, however, that this view is negatived by the fact, that assafetida—and the remark applies to all other articles on the list—relieves hysteria, even when injected into the rectum, and when, of course, there can be no impression made on either the gustatory or olfactory nerves. This is true; but the whole effect appears in such case to be produced by the excitant properties of the gum-resin; and that this is the case is demonstrated by the fact, that if we throw up an excitant—which may never have been classed or regarded as an antispasmodic—we produce the like result. By either agent, a new impression is made on the nerves of the rectum, which may rouse the individual to consciousness. In these cases, the author is in the habit of administering an enema of oil of turpentine,—not, however, because he regards it as possessing any virtues over the excitant oils in general, or as entitled in any respect to the appellation of a direct or true antispasmodic.

Therapeutical Application of Antispasmodics.

To exhibit what little confidence is reposed in true antispasmodics by most practitioners—even by those who consider that such a class really exists—it is well to glance generally but briefly at the different antispasmodics—direct and indirect—that are employed in affections of the nervous system, and are regarded by all as eminently adapted for them;—an inquiry, which will exhibit how much more the latter class is relied on, when much disease is present, than the former. There is, indeed, but one morbid condition, in which *direct antispasmodics* are largely employed at the present day, and the rationale of their action in it is sufficiently manifest.

Tetanus affords us an example of a tonic spasm, which would seem to be signally adapted to test their efficacy. The disease is seated in the great nervous centres; and unfortunately is too often irremediable. Rarely, however, do we find musk, or assafetida, or castor, or any of the *direct* antispasmodics employed, because experience has exhibited their insufficiency. Trust is placed almost wholly in *indirect* agents, and especially in narcotics, of which opium is usually chosen; and it is astonishing what quantities can be borne without the induction of any sign of narcosis. Cases are on record in which fifteen or twenty grains have been given every three hours for several days in succession, and yet but little effect has been produced on the disease, or the patient. Under the excessive erethism of the nervous centres, which constitutes the pathology of tetanus, narcotics do not occasion their ordinary results; and the same remark applies to cases of the great exaltation in the action of the nervous centres, which characterizes many of the diseases belonging to the class *Neuroses*. In such cases, narcotic inhalations—as of ether or chloroform—are manifestly suggested.

A case of tetanus algidus or tetanus from cold, already referred to, which fell under the author's care, may serve to illustrate the mode in which antispasmodics exert their agency. A young man, whilst heated, threw himself into a river to bathe. He immediately experienced some indisposition, and in a few hours afterwards, was attacked with tetanus, in the form of opisthotonos. He was put upon the use of narcotics, but without the disease yielding. He was now taken out of bed, placed in a brook that ran by the house, and pailful after pailful of cold water was thrown over him whenever the spasms became violent. Soon after the adoption of this treatment the spasms yielded; and, by a continuance of it, they ultimately passed away. The boy wholly recovered. This remedy probably acted in the manner described as applicable to antispasmodics in general. It made a new impression on the nervous system by the shock that accompanied the affusion, and thus broke in upon the chain of morbid phenomena seated in the cerebro-spinal axis.

Chorea is another disease in which the true antispasmodics might seem to be indicated, yet they are but rarely employed. The disease appears to depend usually upon great mobility of the nervous system, —chiefly of the part connected with the nerves distributed to the voluntary muscles,—united with diminished impressibility of the nerves of some other parts, as of the stomach and intestines: hence tonics and purgatives are chiefly relied on, and they become *indirect antispasmodics.*

Epilepsy is dependent upon so many causes, that its treatment has to be varied according to circumstances. In the majority of cases, however—as in every disease characterized by periodicity—a powerful impression on the nervous system may prevent a paroxysm; but the impression must be made immediately before it is expected. Except for this purpose, true antispasmodics cannot in any respect be relied on; but if a large dose of assafetida, castor, or musk were administered immediately before the hour at which a fit of epilepsy or of ague was expected, it might prevent it. It is in such cases that mental antispasmodics have been mainly employed. Any agent, indeed, that excites a new and powerful impression—any revellent—may be followed by the same results. Most commonly, epilepsy is attended by evidences of great impressibility and debility of the nervous system; and tonics—especially metallic tonics—are chiefly relied on. It is probably altogether by exciting a new condition in the part to which it is applied, and by modifying circulation and innervation, that a ligature, put around one of the extremities, arrests at times a paroxysm of the disease.

Asthma, again—as elsewhere remarked—must be looked upon as a nervous disease,—spasmodic in its character generally, that is, dependent upon erethism of the branches of the pneumogastric nerves distributed to the bronchial tubes,—but sometimes owing apparently to something like paralysis of the same nervous branches. Hence, different agents are effectual, according to the precise morbid condition. Commonly, however, narcotics are signally beneficial. Opium is given in large doses;—stramonium is smoked; ether and chloroform are inhaled; lobelia inflata is freely administered; galvanism is employed; and all these are occasionally successful; but we rarely hear of the administration of 'direct' antispasmodics; although from the suddenness of the attacks of the disease they might seem to be indicated, and be occasionally useful. They are so completely eclipsed by the 'indirect' agents of the class, that they are very seldom employed.

Hooping-cough, although a peculiar disease, is somewhat analogous in its pathology to the last. When Nasse bruised and pinched one of the pneumogastric nerves in a living animal, so as to break down the structure of the nerve, he found, that convulsive cough was excited like that of hooping-cough. But, although this disease is so markedly convulsive as to have received the name "*bex convulsiva*," and various others indicative of its character, none but indirect antispasmodics have received the confidence of the profession. Narcotics generally have been employed, and of these belladonna more frequently perhaps than any other; but, scarcely ever, assafetida, musk, castor, or any of the 'direct' agents belonging to the class.

In common *colic*, both direct and indirect antispasmodics may be at times advantageously used; and the same may be said of some forms of *gastrodynia*. When these are dependent upon causes, which gentle excitants are capable of obviating, a stimulating gum-resin—like assafetida—may be employed with prospects of benefit. Hence it is serviceable in flatulencies, for the removal of which it is often had recourse to in popular practice.

It is only in *hysteria* that direct antispasmodics are, at this day, much used. The affection is cerebro-spinal, and the symptoms that indicate it are numerous and varied. There is scarcely a nerve or a ramification, however small, which does not occasionally seem to participate in the morbid condition. Generally, the nervous erethism is chiefly concentrated in the cerebro-spinal axis, whence irradiations proceed to every part of the economy; and the object, which the practitioner has in view, is to divert the nervous action to some other portion of the frame. Hence, he administers substances that are as nauseous as possible, combined or not with excitants as he may think proper. With this view he prescribes assafetida, valerian, dracontium, and all the reputed *direct* antispasmodics, during the paroxysm; and in the interval adapts his remedial agents to the indications that may suggest themselves.

These few observations on the use of antispasmodics in diseases in which they would appear to be signally appropriate exhibit the little reliance that can be placed upon such as are esteemed "direct"—the *antispasmodica vera;* and the author does not think he can better terminate the few remarks he has made upon this class than by quoting the conclusion at which a therapeutical writer, often referred to—Dr. A. T. Thomson—has arrived, after having occupied several pages of his work with the explanation of the *modus operandi* of direct antispasmodics. "From what has been said, it is evident that the range of this class of medicines [antispasmodics] is extremely limited; and, in fact, that everything which the substances placed in it can effect, even as direct antispasmodics, may be accomplished by other orders of medicines—purgatives, diaphoretics, narcotics, and tonics. At best, antispasmodics can be regarded only as auxiliaries; and the spasm and convulsions are less to be considered than the causes which induce them: remove the cause, and the effect will cease."

SPECIAL ANTISPASMODICS.

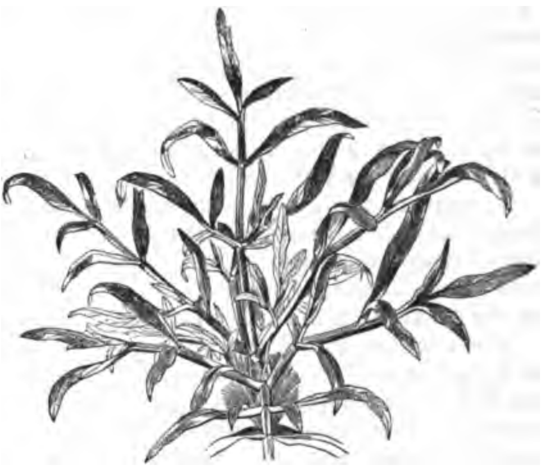
I. *Excitant Antispasmodics.*

1. ASSAFŒ'TIDA.—ASSAFET'IDA.

Assafetida is the concrete juice of *Ferula Assafœtida, Narthex Assafœtida;* SEX. SYST. Pentandria Digynia; NAT. ORD. Umbelliferæ; which is indigenous in Persia, the mountains of Chorasan and Laar. It is considered probable, however, that assafetida is obtained from at least two species of plants. Seeds of the Chorasan plant, which were sent to London in 1839, would seem to have belonged to three species. It is obtained by making incisions into the upper part of the root,—the footstalks of the leaves and the fibres at the top of the root having been previously removed. The juice is scraped off as it exudes. The process may be repeated as often as twelve times in the course of six weeks, before the root is altogether exhausted. The assafetida, gathered from several plants at one time, is united into masses of about one or two pounds in weight; and, when farther hardened by keeping, is sent to the ports of Persia for exportation, or is consumed in the country as a condiment. With the Orientals, indeed, it is highly esteemed—being termed *Le manger des Dieux*, whilst, on the other hand, with us it bears the undignified but expressive appellation of *Devil's dung*,—German, Teufelsdreck.

Assafetida is usually sent from the Persian Gulf to Bombay,

Fig. 102.



Narthex assafœtida.

whence it is exported to Europe. In 1839, the quantity on which duty was paid was twenty-four cwt. That which we receive in this country is either brought directly from India, or indirectly by the way of Great Britain. As met with in the shops, it is in irregular pieces of different sizes, varying generally from half a pound to two pounds and upwards in weight. The pieces have an irregular, amygdaloid appearance externally as well as internally, seeming to be composed of irregular shaped tears, agglutinated by a softer substance. In the inferior kinds, the tears are few in number, and the agglutinating materials more copious. The best pieces are of a yellowish-white color externally; the inferior sorts of a brownish-red hue. All the varieties have the peculiar alliaceous odor, by which assafetida is so well known; and a strong, bitterish, somewhat acrid taste. By exposure to the air, it loses its most striking qualities; and is best preserved in bladders, or in some close space. Except in very cold weather, it cannot be reduced to powder; and then it is apt to cohere. When softened by heat, it may be forced through a cloth, and thus be freed from its impurities. Dr. Pereira describes three varieties. 1. *Assafetida* in the tear, which, he suggests, is the concrete juice of *Ferula Persica;* 2. *Lump Assafetida*, the kind usually met with in the shops, the produce of *Ferula Assafœtida;* and 3. *Stony Assafetida*, which he has never met with in commerce; and which seems to contain 51·9 per cent. of gypsum.

Assafetida has been often subjected to analysis, and its main constituents have proved to be, 1. Volatile oil of assafetida, which, like the essential oils in general, is excitant, and possesses the odorous qualities of the gum-resin; 2. Resin of assafetida; and 3. Gum. Water, cold or warm, dissolves the gum; and the mucilage, thus formed, suspends the resin and volatile oil. Its virtues are yielded to alcohol; and when this is diluted with water, the hydrated resin is separated, and the fluid rendered milky.

It is the best example of a 'direct antispasmodic.' Its volatile oil is powerfully excitant, and makes a nauseous impression upon the gustatory nerves; and its resin is also excitant. It is by virtue of these properties—as remarked of antispasmodics in general—that it is highly useful in diseases in which it is important to make a new nervous impression; hence, its value in hysteria especially, and in certain cases of hypochondriasis. It is, likewise, used in chorea and in hooping-cough; but although much testimony has been adduced in its favor in the latter disease, the author has never seen it of marked advantage. Hooping-cough is a self-limited affection; and no remedies can be productive of much benefit except as palliatives; and in the author's experience, assafetida has scarcely acted as such. In old cases of catarrh, it has been of service, as elsewhere remarked, as an expectorant. In like manner, its excitant properties render it well adapted for flatulent colic.

Perhaps in the whole class of phenomena termed 'nervous' there is no article of the materia medica which is more employed, and none whose action is more satisfactory by reason of the powerful impression it makes on the special nerves of gustation, as well as on those of the stomach, and through them on the general system.

The average dose is ten grains, which, as an antispasmodic, ought to be given in the liquid form, in order that all the effects of the remedy may be exerted. Its operation in this form is likewise more speedy. When given in enema—as it not unfrequently is, in torpid conditions of the bowels, as well as in the paroxysms of hysteria and other convulsive affections—from half a drachm to two drachms may be rubbed up with warm water.

MISTU'RA ASSAFŒ'TIDÆ, ASSAFET'IDA MIXTURE (p. 253).—The dose of this mixture, as an antispasmodic, is f℥ss to f℥iss. It is often given in hysteria and other nervous affections.

PIL'ULÆ ASSAFŒ'TIDÆ, ASSAFET'IDA PILLS.—(*Assafœt.* ℥iss; *Saponis* ℥ss. Make into 240 pills.)—Each pill contains three grains of assafetida.

PIL'ULÆ ALOES ET ASSAFŒ'TIDÆ, PILLS OF ALOES AND ASSAFET'IDA (p. 189). Adapted for nervous cases, which are accompanied with constipation.

TINCTU'RA ASSAFŒ'TIDÆ, TINCTURE OF ASSAFET'IDA.—(*Assafœtid.* ℥iv; *Alcohol.* Oij.) This tincture possesses all the virtues of assafetida, and may be given in the dose of fʒss to fʒj. When water is added to it, it becomes milky, owing to the separation of hydrated resin; but the mixture is efficacious.

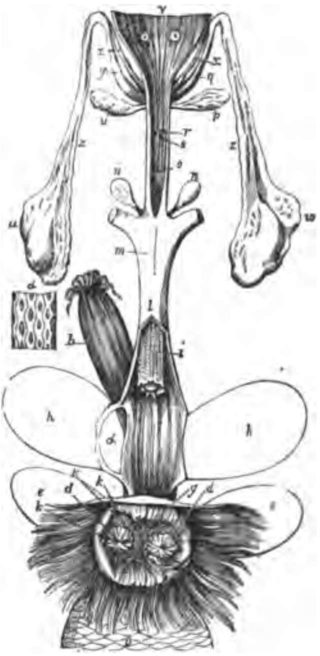
EMPLAS'TRUM ASSAFŒ'TIDÆ, ASSAFET'IDA PLASTER.—(*Assafœtid.*, *Emplast. plumbi*, āā ℔j; *Galban.*, *Ceræ flavæ*, āā ℔ss; *Alcohol. dilut.* Oiij. The assafetida and galbanum are dissolved in the alcohol; the liquor is strained, and evaporated to the consistence of honey; the lead plaster and wax, previously melted, are then added, and evaporated so as to form a plaster.) This plaster is applied over the stomach or abdomen in cases of flatulence, especially when accompanied by hysteria; and to the chest or between the shoulders as an antispasmodic in hooping-cough. It is exceedingly questionable, however, whether any of the virtues of the assafetida or galbanum are exerted in this manner; for simple rubefacient plasters appear to have the same efficacy.

Assafetida is one of the ingredients of *Pilulæ Aloes et Assafœtidæ*, and *Pilulæ galbani compositæ* of the Pharmacopœia of the United States.

2. CASTO'REUM.—CASTOR.

This is a peculiar concrete substance from *Castor fiber*, the *Beaver;* order Rodentia; an inhabitant of Northern Russia, and of the northern parts of North America. Castor is obtained from two follicles situate between the anus and external genitals of both sexes, which are filled with a thick fluid secretion, that slowly concretes after the follicles are removed from the animal. They are generally dried either by smoke, or in the sun; and are frequently united by a part of the preputial membrane.

Fig. 103.



Castor sacs of Castor fiber.

h, *h*, Castor sacs: *w*, *w*, Testicles: *e*, *e*, Oil sacs; *b*, Rectum; *i*, Prepuce.

Almost all the castor of Europe is derived from North America,—the Russian being so very rare as to be scarcely ever seen in Great Britain. Very little Russian castor reaches this country;—that which is brought to Philadelphia being derived chiefly from Missouri. (Wood & Bache.) In the year 1839, according to Dr. Pereira, duty was paid in England on 800 lbs.—the greater part being sold for exportation. The American castor of the shops is contained in sacs about two inches long; flattened and wrinkled; having the appearance of a pair of dried testicles united by their spermatic cord. It is of a dark liver-brown color externally; of a lighter hue internally; of a resinous fracture; a strong, peculiar, disagreeable smell; and an aromatic bitter, nauseous taste. Alcohol is its best solvent.

Russian castor is so scarce that it brings a very high price. Dr. Pereira states, that he has paid for a museum sample £2 per ounce; whilst the American castor brought only twenty shillings a pound. One variety, the *chalky Russian castor*, effervesces when diluted chlorohydric acid is dropped upon it.

The analysis of castor has afforded, as main constituents, a volatile oil of castor; a peculiar substance, called *Castorin* or castoreum camphor, scarcely any of which can be obtained from American castor; and resin, which has a slight odor of castor.

Castor is much less excitant, and less powerful as a nervine than assafetida. It is prescribed in the same diseases, however. The dose is from gr. x, to gr. xx; but it is better given in tincture.

TINCTU'RA CASTO'REI, TINCTURE OF CASTOR.—(*Castor.* cont. ℥ij; *Alcohol.* Oij.) Dose from fℨss to fℨij.

8. VALERIA'NA.—VALE'RIAN.

Officinal Valerian is the root of *Valeriana officinalis*, *officinal* or *great wild Valerian;* SEX. SYST. Triandria Monogynia; NAT. ORD. Valerianaceæ, which inhabits wet places, and sometimes dry banks in most parts of Europe, of which it is a native. The root is dug up in the autumn, when the leaves have decayed. It is sometimes, also, collected in the spring before the stem rises.

The rhizoma consists of a tuberous rootstalk forming a head; and of numerous long, slender, cylindrical fibres issuing from it. It has likewise portions of the stem attached. The color of the root is, externally, yellowish or brown; internally, white; the odor is strong and characteristic, and although disagreeable to man is quite the contrary to cats, which delight in rolling upon it. Its taste is warm, bitter, and nauseous. All its virtues are readily communicated to water, alcohol, and ammoniated alcohol, which are the menstrua employed in the officinal preparations. When subjected to analysis by Trommsdorff, it was found to contain volatile oil, which is its active constituent; valerianic acid; resin; and resinous extractive. The valerianic acid, it has been thought probable, is formed by the oxidation of the volatile oil. It is capable of uniting with bases and forming salts, some of which have been used medicinally.

In March, 1849, Dr. Bailey, inspector of drugs at the port of New York, rejected 1150℔ imported from Paris.

Valerian, in large doses, is excitant to the nervous system, inducing headache, mental excitement, hallucinations, &c. Its action, however, in medicinal doses, is more like that of assafetida, and the other antispasmodics already considered; and it is prescribed in similar cases, especially in hysteria, and hysteroid affections. The dose of the powder is from ʒss to ʒiss, three or four times a day. It is obvious, that as the virtues of the root reside in volatile oil, neither decoction nor extract, which would drive it off, is a proper preparation. The infusion is, however, a correct and good form.

EXTRACT'UM VALERIA'NÆ FLU'IDUM, FLUID EXTRACT OF VALE'RIAN.—This preparation has been admitted into the last edition of the Pharmacopœia of the United States (1851). It is made by exhausting *valerian*, in coarse powder, by means of *ether* and *diluted alcohol* in a percolator, and reducing to the proper consistence by spontaneous evaporation. It contains the properties of valerian, and its dose is fʒj or fʒij.

O'LEUM VALERIA'NÆ, OIL OF VALE'RIAN, obtained from valerian by distillation with water, has been introduced into the last edition of the Pharmacopœia of the United States. It has a pungent odor of valerian, and, as before remarked, is an active constituent of the drug. As an antispasmodic it may be substituted for the root, in the dose of four or five drops. It has been recommended by Dr. J. Leasure as a valuable agent in certain low forms of fever, and in kindred adynamic conditions.

INFU'SUM VALERIA'NÆ, INFUSION OF VALE'RIAN.—(*Valer.* ℥ss; *Aquæ bullient.*

Oj.) The dose of this is f℥iss or f℥ij repeated according to the urgency of the phenomena.

TINCTU'RA VALERIA'NÆ, TINCTURE OF VALE'RIAN.—(*Valerian.* cont. ℥iv; *Alcohol dilut.* Oij. Prepared either by maceration or displacement.) The tincture possesses all the virtues of the valerian, but is rarely given alone, on account of the too excitant effects of the alcohol. A drachm may be added to each dose of the infusion.

TINCTU'RA VALERIA'NÆ AMMONIA'TA, AMMO'NIATED TINCTURE OF VALE'RIAN. (*Valerian.* cont. ℥ss; *Sp. Ammoniæ aromat.* Oij; made either by maceration or displacement.) The addition of the spirit of ammonia, and the aromatics, which are associated with it in the *Spiritus ammoniæ aromaticus*, renders the valerian a more active excitant antispasmodic than the simple tincture. It is an excellent remedy in hysteria, and may be given in the dose of fʒj or fʒij, diluted with water, and sweetened.

VALERIANATE OF ZINC and VALERIANATE OF BISMUTH (see MINERAL TONICS), have been extolled by some of the Italian physicians in nervous diseases, and VALERIANATE OF QUINIA as an antiperiodic tonic. (See ANTIPERIODIC TONICS.)

4. GAL'BANUM.

Galbanum is stated, in the United States Pharmacopœia, to be the juice of an unknown plant. It would seem, that no sufficient evidence exists in regard to its origin; nor is the precise country where it is produced ascertained. It is taken to Europe partly from the Levant, and partly from India; and is met with in two forms,—in tears and in lumps. The latter is the form in which it is usually seen, the lumps being composed of whitish, reddish, or yellowish tears agglutinated by a darker-colored substance, usually mixed with pieces of stalk, seeds, or other extraneous matters. At a freezing temperature it is capable of being reduced to powder; and at the temperature of boiling water, 212°, is sufficiently soft to admit of being strained. It has a peculiar balsamic smell, and a hot, acrid, bitter taste. On analysis, like assafetida, it yields volatile oil, resin, and gum. Like other gum-resins, it forms a milky mixture with water. Its properties are yielded to proof spirit, which dissolves all except the impurities.

Galbanum has antispasmodic virtues, but to a less degree than assafetida; alone, it is very little employed, however, internally. The dose is from ten to twenty grains given in pill; or it may be formed into an emulsion with the addition of gum arabic, sugar, and water.

PIL'ULÆ GAL'BANI COMPOS'ITÆ, COMPOUND GAL'BANUM PILLS.—*Galban. Myrrh.*, āā ʒiss; *Assafœtid.* ʒss; *Syrup.*, q. s. to form 480 pills.) Each of these pills contains half a grain of galbanum, of myrrh, and of assafetida. They have been long known under the name of '*Gum pill*,' and have been much prescribed in Great Britain in hysterical habits. Sometimes, *Extractum colocynthidis compositum*, or aloes is added; when the object is to make them act on the bowels at the same time. The dose is from gr. x to gr. xx.

EMPLAS'TRUM GAL'BANI COMPOS'ITUM, COMPOUND GAL'BANUM PLASTER.—(*Galban.* ℥viij; *Emplastr. plumbi* ℔iij; *Terebinthin.* ʒx; *Picis abietis* ℥iij.) Used in the same cases as Emplastrum Assafœtidæ; but more commonly as a simple excitant plaster, in obstinate tumefactions of an indolent character.

Galbanum is an ingredient in *Emplastrum Assafœtidæ* of the Pharmacopœia of the United States.

5. DRACON'TIUM.—SKUNK CABBAGE.

Dracontium is the root of *Dracontium fœtidum*, *Ictodes fœtidus*, *Symplocarpus fœtidus;* SEX. SYST. Tetrandria Monogynia; NAT. ORD. Aroideæ, which is indigenous in the United States, growing abundantly in meadows and swamps throughout the whole northern and middle sections of the Union; flowering in March and April, and somewhat earlier to the south. Every part of the plant has a disagreeable skunky smell, which resides in a very volatile principle that is dissipated by heat, and is, of course, diminished by drying. The root is in the secondary list of the Pharmacopœia of the United States. It is collected in autumn or early spring, and is carefully dried. The dried root, as usually met with, consists of the body, and the separated radicles. The odor is much less than in the fresh root, but continues for some time. It is not, however, fit for use longer than a single season. When chewed it is distinctly acrid. The principle, on which its virtues are dependent, is volatile, and is dissipated by heat; consequently, decoction is an inadmissible form.

In large doses, dracontium is stated to be narcotic; but in medicinal doses, it possesses the virtues of the articles already mentioned. It may be given in the dose of ten or twenty grains of the powdered root; or in infusion. A syrup—prepared from the fresh root—is said to be a domestic remedy. Dracontium is not, however, much used, and the dried root, as met with in the shops, is of very uncertain strength.

6. AMMO'NIÆ PRÆPARA'TA.—PREPARATIONS OF AMMO'NIA.

All the preparations of ammonia are excitant, and antispasmodic; but the only one that is much prescribed, and the best, is:

SPIR'ITUS AMMO'NIÆ AROMAT'ICUS, AROMAT'IC SPIRIT OF AMMO'NIA.—(*Ammon. muriat.* ℥v; *Potassæ carb.* ℥viij; *Cinnam.* contus., *Caryophyll.* contus. āā ʒij; *Cort. limon.* ℥iv; *Alcohol.*, *Aquæ* āā Ov. Seven pints are distilled.) This is one of the forms of the old *Sal volatile*, much used in popular practice, and in hysteric and nervous affections in general. The result of the process is really ammoniated alcohol, impregnated with excitant volatile oils. The dose is from ♏xx to fʒj, given in sweetened water.

Spiritus ammoniæ aromaticus enters into the composition of *Tinctura Guaiaci Ammoniata*, and *Tinctura Valerianæ Ammoniata*, of the Pharmacopœia of the United States.

7. ÆTHE'REA.—PREPARATIONS OF ETHER.

All the preparations of ether are excitant and antispasmodic. They are transient and diffusible in their action, and well adapted for cases in which Spiritus Ammoniæ aromaticus is indicated. In spasmodic asthma, and other forms of dyspnœa of a nervous nature, they have long been used, and found to afford great relief, when dropped on sugar, and inhaled; and in all cases of severe internal spasm, the preparations of ether have been had recourse to, either alone or associated with narcotics. When inhaled in the mode recommended under NARCOTICS, *sulphuric ether* and *chloroform* are most potent antispasmodics, by virtue of their anæsthetic properties.

1. ÆTHER, *Æ. Sulphuricus, Sulphuric Ether* (described under EXCITANTS). The dose of this is f℥ss to f℥ij dropped on sugar, to which a little water is added; or it may be incorporated with any aqueoús mixture, by rubbing it in a mortar with two grains of spermaceti to each fluidrachm of the ether.

2. SPIR'ITUS Æ'THERIS COMPOS'ITUS, *Compound Spirit of Ether* (see NARCOTICS, p. 413). Hoffman's anodyne liquor is more frequently used as an antispasmodic in hysteric and hysteroid cases than any other of the ethereal preparations. The dose is f℥ss to f℥ij, in the same vehicle as Æther.

3. SPIR'ITUS Æ'THERIS NI'TRICI, *Spirit of Nitric Ether* (see DIURETICS, p. 298). Sweet spirit of nitre has the virtues of the preparations already mentioned; but it is not so often given as an antispasmodic. The dose is f℥j to f℥ij, in a little water.

8. LAVAN'DULA.—LAV'ENDER.

Lavender—as elsewhere shown—is an aromatic excitant (see EXCITANTS); and when its volatile oil is imparted to water, or to dilute alcohol, the preparation is by no means agreeable to the taste of most persons. It, consequently, along with its excitant action on the nerves of the stomach, powerfully impresses those of gustation.

The preparation most frequently prescribed, as an antispasmodic and nervine, is

SPIR'ITUS LAVAN'DULÆ COMPOS'ITUS, COMPOUND SPIRIT OF LAV'ENDER.—(See EXCITANTS.) This is a favorite agent in hysterical and hypochondriacal cases; and is much used as a popular remedy in all cases of nervous faintness, and anomalous symptoms of a similar character. The dose is f℥ss to f℥j, dropped on sugar, or taken in a small quantity of sugared water.

9. MOSCHUS.—MUSK.

Musk is a peculiar concrete juice, obtained from *Moschus moschiferus, musk animal,* a wild ruminating quadruped, rather larger than the domestic goat, and approaching the deer in its characters, which inhabits Thibet and other parts of Central Asia, and more especially the Himalaya and Altai Mountains. At the posterior part of its abdomen, a small sac is situate immediately under the skin, which opens a little in front of the preputial orifice for the penis, and is filled with a thick fluid particularly abundant in the rutting season. This fluid, when dried, is musk. It is removed from the animal with the bag that contains it; and is dried for exportation.

Fig. 104. Fig. 105. Fig. 106.

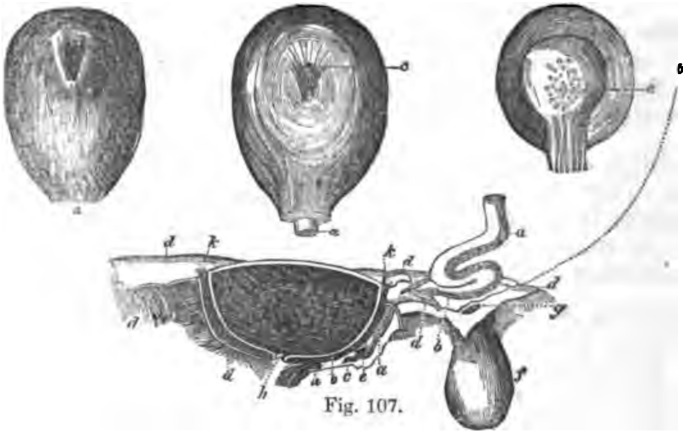


Fig. 107.

Musk Sac.

Fig. 104. Musk sac. *a*. Truncated penis.

Fig. 105. Musk sac, deprived of its hairy coat, to show its muscular coat. *a*. portion of the truncated penis. *c*. Aperture of the musk sac.

Fig. 106. Musk sac deprived of its hairy coat and circular muscular fibres. *c*. Aperture of the musk sac.

Fig. 107. Vertical section of the musk sac in situ. *a*. The penis. *c*. Urethra. *d*, *d*, *d*. The hide. *e*. Glans penis. *f*. Scrotum. *g*. Spot where the spermatic cord is cut off. *h*. Aperture of the musk sac. *i*. Preputial orifice. *k*, *k*. Muscular coat of the sac. *y*. Position of the anus.

Two kinds of musk are met with in commerce,—the China, Tonquin, or Thibet; and the Siberian, Russian, or Kabardine, which is an inferior kind.

The musk-bag or musk-pod is generally plane on one surface; convex on the other,—the plane surface being usually bare; the convex covered with brownish-yellow, or grayish, or whitish bristle-like stiff hairs, arranged concentrically around the orifice of the sac; but, at times, the plane surface is covered with hairs, and the other is not. The remains of the penis are always discoverable. (Pereira.) The pods are about 2½ inches long, and 1¾ broad; and they weigh, on an average, six drachms and a scruple; and contain about two drachms and forty grains of musk.

The musk itself, *grain musk*, is granular—as the name imports—of an unctuous feel, of a dark reddish-brown color, and mixed with hairs. It has a bitter aromatic taste; and a characteristic odor, which is agreeable to most persons, but the contrary to some. It is an odor, which is not restricted to the musk animal, but is exhaled by others, and by some plants.

The only invariable distinction, which Dr. Pereira has observed between the Chinese and Siberian musk, is in the scent, which is much less powerful in the latter; and more nauseous and disagreeable, being somewhat empyreumatic.

The quantity of musk imported into England is considerable. On an average of three years, ending with 1832, the imports of musk from all places eastward of the Cape of Good Hope, with the exception of China, amounted according to Mr. McCulloch, to 4965 ounces a year.

Musk has been frequently subjected to analysis, but the odorous principle has not hitherto been isolated. Artificial pods of musk are not uncommonly met with, of which Dr. Pereira says he has seen several imported from Canton. This is called *Wampo musk*. The mode in which these pods are distinguished from the genuine, is by the absence of any aperture in the middle of the hairy coat, the hair not being arranged in a circular manner; and by the absence of the remains of the penis. The odor of the musk in these spurious sacs is ammoniacal. Musk is likewise subjected to various admixtures, and especially with dried blood.

Musk is unquestionably excitant, and by reason of its excitant property, as well as by powerfully impressing the nerves of smell, it is antispasmodic. Jörg found it to be hypnotic in small doses; and in large doses it caused headache, tremors, and even convulsions. Other observers, however, as MM. Trousseau and Pidoux, experienced neither excitant nor hypnotic effects from it; but it appeared to them to stimulate the genital organs. It is in the neuroses and in spasmodic affections, that it has been most prescribed,—as in hysteria, epilepsy, convulsions of children, chorea, and hiccough; and it has been given in tetanus. Its excitant properties have led to its use in low fevers accompanied with much nervous debility; in retrocedent gout, &c. It is not, however, worthy of the reputation which it had at one time, whilst it is a very expensive article, and by no means always pure. Hence, it is not much employed at the present day. The medium dose is ten grains, to be repeated every two or three hours in the form of bolus; or it may be suspended in water by means of mucilage of gum arabic and sugar. It has been given in the form of enema in the convulsions of children.

10. SUC′CINUM.—AMBER.

O′LEUM SUC′CINI RECTIFICA′TUM, REC′TIFIED OIL OF AMBER, as elsewhere shown, is excitant, and by reason of its powerful impression on the nerves of gustation and olfaction, is likewise antispasmodic. It has been given in the various neuroses, in which antispasnodics in general are indicated, in the dose of from gtt. v to gtt. xv, dropped on sugar, or made into an emulsion with mucilage of gum arabic and sugar. It has been advised also locally in hooping-cough, and convulsions of children, mixed with an equal portion of laudanum, and diluted with three or four parts of olive oil and brandy. This was a favorite prescription with the late Dr. Parrish, of Philadelphia.

11. CREASO′TUM.—CRE′ASOTE.

The powerful sensible properties of this substance, described elsewhere (see ASTRINGENTS), would naturally suggest its employment as an excitant antispasmodic; yet it has not been much used as such, although, in well-regulated doses, it may be as efficacious as any of the class. In certain cases of neuralgia, advantage appears to have been derived from it, but in general, it was of little or no service. Good effects have followed its use in hysteria—of course when there was no inflammatory complication; as well as in spasmodic erethism of the nervous system, and in palpitation. It has been used by Dr. Herndon, of Virginia, with benefit, in hysteric croup, in the way of inhalation—thirty drops being added to a quart of hot water. The dose may be a drop or two of creasote given occasionally in gum water; or the following mixture may be prescribed;—(*Creasot.* ♏iv; *Aq. camphor.* f℥vj. M. Dose, one quarter.)

12. Certain *Volatile Oils*, besides those already mentioned, as OLEUM TEREBINTHINÆ, DIPPEL'S ANIMAL OIL, OLEUM CAJUPUTI, &c., which, along with their excitant qualities, make a powerful impression on the nerves of gustation and olfaction, are generally classed amongst antispasmodics. Their general poroperties are described elsewhere. The same may be said of CAMPHORA.

SECTION V.

AGENTS THAT AFFECT PROMINENTLY THE ORGANS OF REPRODUCTION.

I. EMMEN'AGOGUES.

SYNON. *Menagoga.*

Definition of emmenagogues—Modus operandi—No direct emmenagogues—Special emmenagogues.

EMMENAGOGUES may be defined—"Agents, that promote the menstrual discharge." That there are any such specific agents is by no means established. In the present state of our knowledge, we may affirm, that there are none. Experience alone has taught us this; for there is obviously no more reason, why there should not be substances capable of exerting a remedial agency on the organs concerned in the function of menstruation, than that there should not be others, which exert a cathartic or emetic operation by their preference for the stomach and intestines.

The views of Dr. Paris on this division of medicinal substances closely correspond with those of the author. "As amenorrhœa, or retention of the menses," he says, "is generally the effect of a morbid state of the body, it follows, that remedies capable of acting as emmenagogues can only be *relative* agents, unless indeed we are disposed to accede to the opinion so generally maintained in the writings of the older physicians, but now generally discarded, that certain substances exert a specific action upon the uterus. It may certainly be asserted without fear of contradiction, that there are many substances, which, when received into the stomach, have their stimulant operation more particularly determined to one part than to another, —alkalies, for example, to the kidneys; cantharides to the bladder;

mercury to the salivary glands, &c. Reasoning therefore by analogy, it was not unphilosophical to conclude, that similar medicines might exist with respect to the uterus; but experience has negatived the supposition, there being no proof of any of the substances styled *emmenagogues* producing their effects by any *specific* influence upon the uterine system. If the term *emmenagogues* be assumed conventionally, according to this view of the subject, it may be retained without any fear of error, otherwise it would be wiser to remove the name from our classification."

A modern writer on Materia Medica and Therapeutics, Dr. A. T. Thomson, has given the following table of '*direct*' emmenagogues, or in other words, of such as are "supposed to operate by their stimulant influence on the uterus itself," and he has subdivided them, it will be observed, into '*immediate*' and '*mediate*'. "In the second of these subdivisions," he remarks, "some substances will be found, the direct influence of which on the uterus is doubtful; they maintain their place rather in conformity with the prevailing opinions, than from a conviction that their action on the uterine system is such as to authorize the position which they hold."

"Direct Emmenagogues:

1. IMMEDIATE.

a. Electricity.—Electricitas.

2. MEDIATE.

* *Organic Products.*

b. Oleo-Resins.—Contained in
Roots—Polygala *Senega.*
Ruta *graveolens.*
Herb.—Juniperus *Sabina.*

c. Bitter Principle.—Contained in
Roots.—Rubia *Tinctorum.*

** *Inorganic Substances.*

d. Mercurials.—'Præparationes' [Præparata] 'Hydrargyri.'"

Yet not one of these agents can be properly regarded as producing its effect by any specific operation on the uterus. The only one, which we *know* to operate upon that organ—inasmuch as we can subject the region directly to its action—is electricity; and it does so only by virtue of that excitant agency, which it exerts upon every other tissue,—not by any special action, which can entitle it to the appellation of a '*true*' or '*direct*' emmenagogue. Dr. Thomson's doubts of the propriety of his own classification, and of the admission of direct emmenagogues, is signally shown in the following remarks, after he has described the fancied emmenagogue virtues of the different articles comprised in the list just cited. "Upon the whole, from what has been said, it is obvious, that electricity is the only direct emmenagogue, and that the idea of the others acting upon the uterus itself is rather inferred than certain. It is nevertheless true, that, in whatever manner they act, emmenagogues stimulate the uterus; and therefore caution is requisite to be observed in their administration. We must be certain, in the first place, that the suppression is not connected with pregnancy: in such a state, it would be highly injurious to prescribe direct emmenagogues; as not only abortion may be induced, but inflammation may be set up, and lay the foundation of an organic disease of the uterus. There is often, indeed, much difficulty in deciding upon the propriety of employing direct emmenagogues, even when the suppression is not connected with pregnancy: the uterus may be in such a state of active disease as to render their influence upon it extremely hazardous."

Much harm has arisen from a belief in the existence of direct emmenagogues, without discriminating the causes that may have given rise to the suppression of the menstrual secretion. In all cases, such causes must be appreciated, and the treatment be directed to their removal, as well as to that of the morbid condition of the general system, or of the uterus, produced by them. Accordingly, emmenagogues must always be of an indirect kind; and the term, as Dr. Paris has suggested, should be retained as conventional, to express such an indirect operation. Most commonly amenorrhœa is connected with a state of atony of the general system, which demands the use of excitants; and hence, amongst the reputed emmenagogues, we have a long catalogue of substances belonging to the divisions of excitants proper, and tonics. The oxides and salts of iron have been especial favorites with the practitioner; and, accordingly, we find enumerated, under the present division of remedial agents, the carbonate, the sulphate, the black oxide, the alkaline solution, the ammoniuret, the tartrate, &c., of that metal. But, although atony may be the general cause of amenorrhœa, the disease is sometimes induced by an opposite condition of the system in which excitants would be manifestly improper, and remedies of another kind are clearly indicated. This is not the place to inquire, whether menstruation be a simple transudation of blood through the parietes of the vessels of the uterus; and whether it be regarded as a secretion or as a periodical hemorrhage, it is clear, that the lining membrane of the uterus, with the rest of the internal genital apparatus, must be a centre of fluxion, nervous and vascular, during the period of the flow; and if any powerful mental impression be made, when the discharge is about to take place; or a source of morbid irritation be present in any viscus; or if there be undue excitement in the system generally, and in the uterus in particular,—or an opposite state, the due concentration of nervous and vascular energy towards the uterine system may be interfered with; and amenorrhœa supervene, and continue until such distracting cause is removed.

From what has been observed regarding the conditions of the general system, which may occasion amenorrhœa, it will be easy to understand, that the plan of medication must in all cases vary according to the state of the general health. But remedies may be administered as emmenagogues, which act little on the general system, and affect the uterus by contiguous sympathy chiefly. Thus, if that viscus be in a state of asthenia, a diuretic or local stimulant to the kidneys may prove emmenagogue; and, in the same manner, a cathartic, especially one that acts on the lower portion of the intestinal canal, may excite the uterus to the degree appropriate for the fulfilment of its healthy functions. On these grounds, aloes, as elsewhere seen, has acquired its reputation as an emmenagogue; and there is, perhaps, no article of the materia medica that has been so extensively administered with this view. It appears to have no direct operation on the uterus: its agency is confined to its cathartic powers,—the local stimulation, thus induced, extending by contiguous sympathy to the uterus, and, in this indirect manner, occasionally producing a restoration of the suppressed secretion.

Formerly, the condition of the uterus was looked upon as exerting a predominant influence on the rest of the economy, and as the cause of various morbid phenomena, which could not well, in the existing state of knowledge, be referred to any other influence. The protean symptoms of hysteria were, as the name imports, considered to be engendered in the uterus. This term, as well as *præfocatio matricis*, *vapores uterini*, *strangulatio uterina*, and the German names Mutterkrankheit, Mutterbeschwerden, and Mutterbeschwerung,—from Mutter, "the uterus,"—sufficiently indicate the supposed seat of the mischief. It is now admitted to be caused by cerebro-spinal irritation, connected in particular cases with uterine disturbance,—such disturbance, however, appearing to act indirectly only, by producing or developing general nervous irritability; and this view is confirmed by the fact, that well-marked hysteria is occasionally met with in men.

The condition of the uterine functions has always to be looked to, —especially in chronic diseases; but experience has shown, that any aberration of those functions is more frequently the consequence than the cause of such diseases. The author cannot, indeed, conclude the consideration of emmenagogues better than by quoting the following apposite remarks of a writer already cited, Dr. Thomson, at the termination of his investigation into the properties usually assigned to this class of remedies. "The importance of the catamenia in preserving the health of the female habit is undeniable; and therefore everything that can tend to maintain its regular return, and to promote its due quantity, is of great importance in a practical point of view. In every chronic complaint of a female it is requisite to ascertain the state of the catamenia; but, before advising any medicine for the purpose of influencing the uterus in any manner, the cause of the suppression or of the irregularity, of whatever description it may be, must be minutely investigated. Without obtaining such a knowledge of the state of the organ, and ascertaining how far the suspension or irregularity is due to the condition of the organ itself, or to the general system, our practice must ever be uncertain; in floundering about, and trying various remedies, without rule or discrimination, we may, it is true, stumble by accident on something effectual; but much evil may be produced."

The local means, that are most frequently employed with the view of soliciting the blood towards the uterus, or the lower part of the body, are pediluvia and semicupia; fomentations to the generative organs; warm injections into the vagina or rectum; leeches to the pudendum and inner sides of the thighs; cupping over the thighs; and bleeding from the feet;—but these, to be useful, ought to be employed about the expected period of recurrence of the catamenia; and especially when general or local polyæmia exists. Frictions have, likewise been made over the lower extremities; and electricity has been used to arouse the uterus, where there has been reason to suspect torpor of that viscus.

Whatever agents are employed must be prescribed with due caution, and with proper attention to the pathological condition that gives occasion to the amenorrhœa.

SPECIAL EMMENAGOGUES.

I. *Cathartic Emmenagogues.*

1. A′LOË.—AL′OES.

Under another head (p. 187), it was shown, that the cathartic effect of aloes is exerted chiefly on the lower part of the intestinal canal; and it has been just remarked, that by contiguous sympathy, it may excite the uterus, so as to favor the recurrence of the menstrual secretion when it has been arrested by any cause which a local excitant is capable of removing; "its action on the rectum, and extension of this action to the uterus, producing a state of the organ closely allied to that which is the result of the application of a direct stimulus." (Dr. A. T. Thomson.) It has been affirmed, however, that aloes has a decided tendency to the uterine system, and Dr. Wood, of Philadelphia, adds, that he can see no reason why the medicine should not act specifically upon the uterus; and that its influence in promoting menstruation is by no means confined to cases in which its action upon the neighboring intestine is most conspicuous. It is true there is no such reason; but, at the same time, there appears to be no adequate evidence, that any such special action on the uterus is exerted by the drug; and it certainly has not seemed to the author to be more efficacious than other excitant agents thrown into the rectum in restoring the catamenia. Dr. Cullen was of opinion, that it rarely succeeds; and most unquestionably it often fails;—more frequently than could well happen, if any special action were exerted by it upon the organ.

When not given in the form of *enema*,—which, in the London Pharmacopœia, is directed to be made of *Aloes* ℈ij; *Carbonate of potassa* gr. xv; *Decoction of barley* Oss—a short time before the expected return of the catamenia, one of the following formulæ may be prescribed, for two or three days prior to the expected menstrual period.

PIL'ULÆ AL'OES ET MYRRHÆ, PILLS OF AL'OES AND MYRRH (p. 189).—These pills, commonly called *Rufus's* or *Ruffus's Pills*, are given in the dose of ten to twenty grains.

PULVIS AL'OES ET CANEL'LÆ, POWDER OF AL'OES AND CANEL'LA (p. 189).—This powder, so long known under the name *Hiera Picra*, or "the holy bitter"—vulgarly pronounced *Hikry Pikry*—is a popular remedy in amenorrhœa,—either taken alone, or mixed with wine or brandy. Its dose is from ten to twenty grains.

TINCTU'RA AL'OES ET MYRRHÆ, TINCTURE OF AL'OES AND MYRRH (p. 189).—The properties of this tincture are like those of *Pilulæ Aloes et Myrrhæ.* The dose is fʒss to fʒij.

VINUM AL'OES, WINE OF AL'OES (p. 190).—The dose in amenorrhœa is fʒi to fʒij.

Besides aloes, other cathartics, as *colocynth*, *gamboge*, *rhubarb*, and *croton oil*, are occasionally administered as emmenagogues; but by no means so frequently as it.

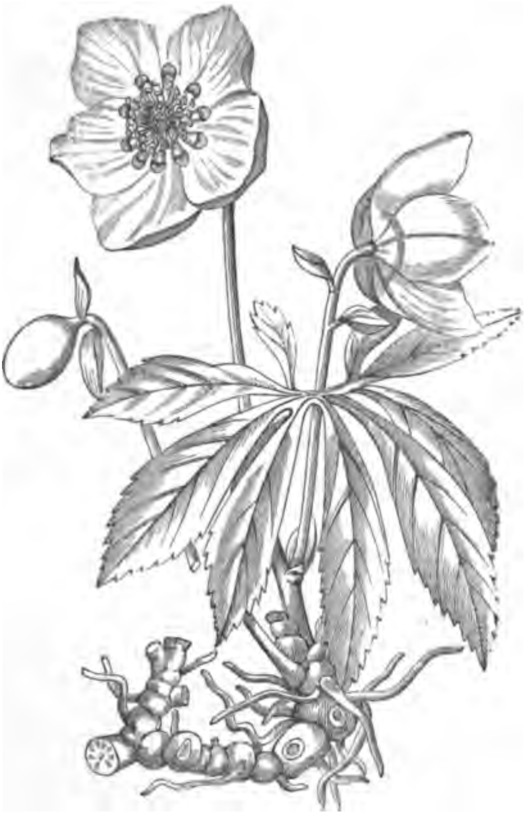
2. HELLEB'ORUS.—BLACK HEL'LEBORE.

This is the root of *Helleborus Niger*, *Black Hellebore*, or *Christmas Rose;* SEX. SYST. Polyandria Polygynia; NAT. ORD. Ranunculaceæ; an herbaceous plant, which is a native of various parts of Greece, as well as of the Levant; and inhabits sub-Alpine woodland regions in the middle and Southern parts of Europe. It flowers between December and February; hence its name,—*Christmas Rose.* It is cultivated in the gardens, chiefly in consequence of the period of the year at which it flowers. The hellebore of antiquity appears to have been *Helleborus officinalis.* It is usually imported into England from Hamburg; but sometimes from Marseilles. (Pereira.)

Black hellebore root consists of a black root stock, and numerous fibres or radicles, which are of a brownish-black color externally, whitish or yellowish within, and of about the thickness of a straw. The smell is feeble, and like that of senega root; and the taste slight at first, and afterwards bitterish, nauseous, and acrid; but, as met with in the shops, it does not exhibit much acridity. The active properties would seem to be dependent upon an acrid oil. They are extracted by both water and alcohol.

In an overdose, black hellebore is an acro-narcotic poison. In medicinal doses, it is emetic and cathartic; but, although much used by the ancients in head affections, and especially in insanity, it is now never given as a simple cathartic or emeto-cathartic. Many, however, of the present day, have great confidence in its emmenagogue virtues, which some have ascribed to its possessing a specific action on the uterus; but the majority, with more propriety, refer its action on that organ to its effect upon the intestinal canal. Dr. Mead believed it to be superior to any other emmenagogue.

Fig. 108.



Helleborus Niger.

The dose of the powdered root, as an emmenagogue, is from gr. v, to gr. x, or more, according to the effects.

TINCTU'RA HELLEB'ORI, TINCTURE OF BLACK HEL'LEBORE. — (*Hellebor.* contus. ℥iv; *Alcohol. dilut.* Oij; prepared either by maceration or displacement.) The dose of this preparation is from f℥ss to f℥i.

EXTRAC'TUM HELLEB'ORI, EXTRACT OF BLACK HEL'LEBORE. — (Made by the process of displacement, from *black hellebore* in coarse powder.) This preparation, which is not officinal in any of the British Pharmacopœias, purges drastically in the dose of twelve or fifteen grains. It is rarely or never employed as an emmenagogue.

Bacher's Pills—formed of this *extract*, and *myrrh*, each ℥i; powdered leaves of *carduus benedictus* ℨiij,—were introduced into the French Codex under the name *Pilulæ ex Helleboro et Myrrhâ*, and had a high reputation as an emmenagogue; but they are not much, or not at all, used.

II. *Excitant Emmenagogues.*

As the condition of amenorrhœa is so often dependent upon an asthenic condition of the system, various excitants have been employed, including almost all those, that are usually regarded as antispasmodics: the following have, however, been held in the highest repute by different therapeutists.

8. ASSAFŒ'TIDA.—ASSAFET'IDA.

It has long been maintained, that assafetida has a specific action on the uterus, and the results of various observers appeared to show, that it was capable of bringing on the menstrual discharge sooner than usual (Jörg); but if it be admitted, that such is the result of the use of assafetida in health,—for the experiments were made on healthy individuals,—it is by no means admitted, that the same result would follow in disease; and accordingly assafetida is now rarely or never employed in amenorrhœa, and the same may be said of

4. CASTO′REUM.—CASTOR; AND

5. GAL′BANUM,

Which were used as emmenagogues by the ancients; and are still occasionally employed, but not in this country, in affections, that are complicated with obstruction of the catamenia.

6. HEDEO′MA.—PENNY′ROYAL.

This herb—as stated under EXCITANTS—is indebted for its properties to the essential oil which it contains. It is a popular emmenagogue; but is rarely prescribed by the physician. It is usually given copiously in the form of hot *Pennyroyal tea;* the feet being, at the same time, placed in warm water, or in a mustard pediluvium.

European Pennyroyal—Mentha Pulegium—is considered to possess the same properties; and is used as a domestic remedy by European females.

7. JUNIP′ERUS VIRGINIA′NA.—RED CEDAR.

This evergreen, SEX. SYST. Diœcia Monadelphia; NAT. ORD. Coniferæ, grows in every part of the Union. The leaves are in the secondary list of the Pharmacopœia of the United States. They have a strong characteristic odor; and an aromatic bitterish taste. The essential properties reside in volatile oil; and, besides, tannin exists in them. The medical virtues are analogous to those of savine; but less in degree. It is frequently known thoughout the country by the name of *Savine.* (Prof. Bigelow.) It may be given as an emmenagogue in infusion (*Junip. Virginian.* ℥ij; *Aquæ* Oss.—Dose, f℥iss to f℥iij); but it is not often prescribed.

8. SABI′NA.—SAV′INE.

Savine is the tops of *Juniperus sabina, common savine,* which is a native of the south of Europe, and of Asiatic Russia; but thrives under cultivation in Great Britain. It is said to grow wild in the neighborhood of the northwestern lakes. The tops have a strong characteristic smell, especially when bruised; and a disagreeable, bitter, acrid taste; and these properties are retained, to a certain extent, when the tops are dried.

The medical properties of savine are chiefly dependent upon an essential oil, which is officinal; and they are yielded to water, alcohol and fixed oils. The leaves have been subjected to analysis by Mr. C. H. Needles, and have yielded the following constituents,—gum, tannin, resin, chlorophyll, fixed oil, *volatile oil,* salts of potassa, lime, and bitter extractive.

In large doses, it is an acrid poison, inducing vomiting, purging, and every sign of violent inflammation of the lining membrane of the stomach and intestines. In one case, in which the oil had been given with the view of inducing abortion, it caused violent nephritis. It is by reason of its powerful action on the system of the mother, that it is sometimes effective in separating the connection between her and the fœtus; and thus occasioning the expulsion of the latter. Fatal cases are, indeed, recorded, where it had been given as an emmenagogue. Dr. Francis Home, of Edinburgh, highly extolled it in amenorrhœa dependent upon torpor of the uterus; but it has not been much used of late in consequence of the uncertainty, and at times the severity, of its operation. Dr. Pereira has affirmed—as the result of his own observation—that it is the most certain and most powerful emmenagogue of the materia medica; that he has employed it in numerous cases, and has never seen any ill effects from its administration. The dose of the powder is from gr. v to gr. xv repeated three or four times a day. It may likewise, be given in infusion; *Sabin.* ʒj; *Aquæ bullient.* Oss.—Dose, one or two table-spoonfuls.

O'LEUM SABI'NÆ, OIL OF SAVINE.—This oil is obtained from savine by distillation. It has the odor of the plant; and an exceedingly acrid bitter taste. It is used in the same cases as savine itself, and is the preparation generally employed when the object is to produce abortion. This it accomplishes by the violence it does to the system of the mother, inducing gastro-enteritis, and nephritis, and occasionally death. As an emmenagogue, the dose is from two to six drops, made into a mixture with sugar or mucilage. Dr. Pereira regards the oil as by far the most convenient and certain preparation of savine, and it is the one which he always employs.

9. RUTA.—RUE.

Rue is the root of *Ruta Graveolens*, *Common* or *Garden Rue;* SEX. SYST. Decandria Monogynia, NAT. ORD. Rutaceæ; a perennial plant, which is indigenous in the south of Europe and the Levant; and is often cultivated in the gardens of this country. It flowers from June to September. The leaves are officinal in the secondary list of the Pharmacopœia of the United States.

The herb has a strong disagreeable odor, which is dependent upon a volatile oil, obtainable by distillation,—*Oleum Rutæ* of the Edinburgh Pharmacopœia. It contains, also, bitter extractive. The taste of the leaves is bitter and acrid; and when fresh, they irritate the skin; and, at times, even excite vesication. They yield their virtues to hot water.

From what has been said, it is obvious, that rue is a powerful excitant; hence, and as it makes also a vivid impression on the nerves of gustation and olfaction, it proves antispasmodic; and is frequently used as a domestic remedy in hysteric and other nervous affections. It is not often prescribed, however, by the physician as an antispasmodic. Amongst the *laity*, it has great reputation as an emmenagogue; and some practitioners have believed it to be not only as useful in catamenial obstructions as other more esteemed emmenagogues, but have thought its action to be so peculiarly directed to the uterus as to be capable of inducing menorrhagia, abortion, and inflammation. (Christison.) It is rarely, however, used by the profession as an emmenagogue. The dose of the powder is from fifteen to thirty grains, two or three times a day; but it must be given with caution, as there is some reason to believe it to be an acronarcotic poison.

It is more commonly given in infusion—*Rue Tea* (*Rutæ* ℥j; *Aquæ bullient.* Oj).—Dose f℥iss to f℥ij.

Oil of rue is sometimes prescribed in the dose of two to six drops in sugared water.

10. RU'BIA.—MADDER.

Madder is the root of *Rubia Tinctorum*, *Dyer's Madder;* Sex. Syst. Tetrandria Monogynia; Nat. Ord. Rubiaceæ; a native of the south of Europe and the Levant; which is cultivated in various parts of the continent of Europe; and is exported largely from the Levant, Holland, and the south of Europe. It contains a variety of coloring matters—the most important of which is the madder-red or *Alizarin.* (Pereira.) The root—which is officinal in the secondary list of the Pharmacopœia of the United States—is long, cylindrical, of about the thickness of a writing-quill, and of a deep reddish-brown color externally. The woody meditullium is yellow when fresh, but becomes reddish by drying. The odor of the root is weak and peculiar; the taste bitter and astringent.

Madder has been considered by some to be possessed of emmenagogue virtues; and Professor F. Home, of Edinburgh, believed it to be the strongest and safest emmenagogue known. It may be of service, when tonic emmenagogues are indicated; but it has not the confidence of physicians; and is, therefore, scarcely ever used. Its remarkable property of coloring red the bones of animals fed on it is well known. The dose may be half a drachm, repeated three or four times a day.

11. TANACE'TUM.—TANSY.

Tansy—whose general properties are described under Anthelmintics (p. 236)—has been much used in domestic practice in uterine affections. It has borne the reputation of an emmenagogue; and, by virtue of its bitter principle, and essential oil, it may act as such in cases where the excitant emmenagogues are indicated. In popular practice, it is supposed even to arrest uterine hemorrhage; and, in the Southern States, the author has known a bag of tansy placed over the abdomen with the view of restraining the flow! It is scarcely ever prescribed by the regular practitioner.

12. ELECTRIC″ITAS.—ELECTRIC″ITY.

The excitant influence of electricity (see Excitants) can be made to bear immediately on the uterus, when, from the attending phenomena, there is reason to believe that amenorrhœa is dependent upon torpor of that organ.

The practitioner has it in his power to graduate the amount of excitation. Thus, where a gentle stimulation is needed, it may be sufficient to insulate the individual, and to draw electricity from the pelvic region in the form of the electric pencil; where a greater degree is needed, by sparks; and where a still greater, to make the uterus a part of the electric circuit, and discharge a Leyden jar through it,—graduating properly the extent of the discharge according to the demands of the case. Or, continuous GALVANIC ELECTRICITY may be substituted, or the shocks produced by interrupted currents, as by the ELECTRO-MAGNETIC APPARATUS.

In the opinion of Dr. Golding Bird, we possess in electricity the only really direct emmenagogue with which the experience of our profession has furnished us. "I do not think," he remarks, "I have ever known it to fail to excite menstruation when the uterus was capable of performing this function." "The rule," he adds, "for insuring success in the great mass of cases of amenorrhœa is sufficiently simple. Improve the general health by exercise and tonics, remove the accumulations often present in the bowels by appropriate purgatives; and then a few electrical shocks, often a single one, will be sufficient to produce menstruation, and at once to restore the previous deficient function." It is proper to remark, however, that improvement of the general health is itself an efficient agency in the removal of amenorrhœa.

An admirable mode of applying the remedy, according to Dr. W. F. Channing, is the hip-bath, in which one of the poles of the electro-magnetic or galvanic apparatus is immersed near the organs to be especially acted upon. The other handle is applied in the course of the spine, or in the bath on the opposite side of the body.

Electro-magnetism has been employed with advantage in dysmenorrhœa. Dr. Robert L. McDonnell, of Montreal, derived more benefit from it in this disease, when an uninterrupted and steady current was passed, than from occasional shocks of great intensity. The current may be sent transversely through the pelvis by placing a button on each hip above the great trochanter.

The effects of the different forms of electricity as a parturifacient are referred to under the next head.

Such are the prominent articles that have been used as emmenagogues. Besides them, however, others have been proposed by different observers. A modern writer, Dr. Churchill, of Dublin, expresses the opinion, that IODINE, ERGOT, and STRYCHNIA, are the least doubtful in regard to their power of acting on the uterus. Iodine may be given in the form of *Tinctura Iodinii composita*, the dose of which may be gtt. x to gtt. xxx, three times a day. Ergot may be prescribed in powder, gr. v—x, two or three times a day; and strychnia, in the form of tincture, from six to twenty-four drops, twice or thrice a day. It is very doubtful, however, whether any of these agents be entitled to any reputation: indeed, they have been classed, along with others, by a respectable writer, Dr. Ferguson, as *nostrums*. "There are numberless nostrums"—he remarks—"of greater or less value, which, from their very number, prove how capricious a disease is amenorrhœa, and how curable. Dale excites the mammæ by repeated application of one or two leeches; the organ enlarges greatly, and the uterus sympathizes on being thus aroused. Very many authors give five to eight grains of ergot. Carron du Villard recommends cyanuret of gold in minute doses; Bradley gives strychnine; Brera iodine; Amussat applies an exhausted glass to the uterus, and Rostan, leeches."

Tincture of guaiacum, so highly extolled by Dr. Dewees as a specific [?] in amenorrhœa and dysmenorrhœa, might be classed in the same category.

II. PARTURIFA'CIENTS.

SYNON. *Parturifacientia*, *Parturientia*, *Abortiva*, *Amblotica*, *Phthoria*, *Apophthoria*, *Ectrotica*, *Ecbolica*, *Abortives*, *Parturients*, *Ecbolics*.

Definition of parturients—Most of them indirect agents—Often destroy the mother—Aristolochics—Special parturifacients.

What has been said of emmenagogues might, perhaps, be extended to parturifacients or abortives, which have been defined by Dr. Eberle—"substances that promote the parturient energy." Certain it is, that fifty years ago, no man of science, in this country, would have asserted that we are possessed of an agent that acts on the uterine fibres by virtue of specific powers. Since that period, however, such an agent—ergot—has been brought to the notice of the profession, and has received so many testimonials in its favor as to cause its admission into every work on Materia Medica and into every Pharmacopœia. In no country has this substance been more employed than in the United States, and in none has it so many supporters. Yet there are some, who, from their experience, are not satisfied that it exerts the power over the gravid uterus which has been ascribed to it. It must be admitted, that no cases could present themselves, in which it is more difficult to trace accurately the relation between cause and effect. Every one, who has practised extensively in obstetrics, must have observed, that the parturient efforts occasionally flag, and indeed are wholly suspended; yet they recur, and the labor proceeds rapidly to a favorable termination; and if, in any such case, a remedy, presumed to be parturifacient, were administered during the period of the cessation of pain, the recurrence of the pain in this sudden manner could hardly fail to be ascribed to the antecedent—the administration of the presumed parturifacient. Let the obstetrical practitioner, who has never had recourse to any such agent, call to mind, how few the cases are in which delivery has had to be assisted, in consequence of the *total* cessation of the pains; and how common it is to meet with a partial or temporary cessation; and he must be satisfied, that the absolute necessity for the use of a parturifacient is not a very common occurrence.

But if hesitation be indulged in admitting the possession by the ergot of any specific powers over the uterus, there can be none as respects the other substances, that have been employed as parturifacients. They are all indirect agents, and act upon the ovum through the mother, endangering her life, as well as that of her infant. The ancient remark, that "she who destroys her offspring *in utero* often perishes"—"*sæpe suos utero quæ necat ipsa perit*,"—is admitted to be correct by all writers on medical jurisprudence, and by every one who has at all investigated the subject.

The drugs and agencies employed with the view of inducing abortion are of the most powerful kind,—emetics, purgatives, acro-narcotic poisons, mercury,.&c. Bleeding, too, has often been practised with this intent, but it has rarely or never been successful.

Of late years, ELECTRICITY has been employed as a parturifacient; and its stimulating effect on the voluntary muscular tissue naturally suggested it in affections of the organic, although the physiologist is well aware, that they are differently affected by electricity. It was first, perhaps, suggested in such cases by Herder, of Leipzig, in 1803; and afterwards, in 1834, by Dr. Frank Ramsbotham, but it does not appear to have been employed by them. It was introduced into practice, as a means of exciting uterine contraction, by Dr. Radford, in a case of uterine hemorrhage with extreme exhaustion, before delivery, the os uteri remaining rigid; when he ascertained—to employ his own words—"that galvanism produces an effective and powerful contraction of the uterus, and not only so as regards its tonic contraction, but it has also the power of energetically exciting alternate contraction when applied at intervals." He, consequently, urged it in all cases in which artificial delivery would be deemed advisable on account of hemorrhage; as well as in tedious labor; and suggested its application to the production of premature labor, and to uterine hemorrhage where the os uteri is patulous and the uterus inert.

The apparatus employed by him was a coil machine, one pole of which was applied to the abdominal parietes over the fundus uteri; the other to the os uteri. Or, the electricity may be applied by placing the negative electrode in a footbath with the feet, whilst the positive electrode is placed over the lumbar region,—a succession of shocks being passed for from three to five minutes. Dr. Walkly, of Mobile, thinks electro-magnetism far preferable to ergot as a parturifacient, for the reason that the pains induced by it are regularly intermittent as in natural labor, and hence not likely to injure either the mother or the child. In several trials, however, by Professor Simpson, of Edinburgh,—made with the view of ascertaining the exact degree of influence exerted by galvanism over the contractile action of the uterus during labor, and, consequently, the amount of aid to be expected from it in cases in which its use might seem to be indicated,—the general results were by no means in its favor; and he infers, that as employed at the present time, and in its present mode, it is not a means, which can be in any degree relied on to directly excite or increase the contractile action of the uterus, "and is so far practically and entirely useless as a stimulant to the parturient action of the uterus." There can be no doubt, however, from the mass of testimony, much of which has been collected by Dr. William F. Channing (*Notes on the Medical Application of Electricity*, Boston, 1849), that uterine contraction may be excited by the powerful stimulation, which interrupted electro-magnetic currents are capable of inducing.

ARISTOLOCH'ICS.

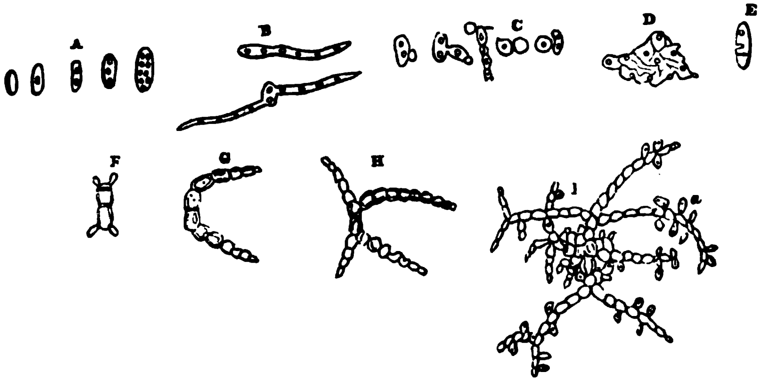
The German writers admit a class *Aristolochica*, "agents which promote the lochial secretion" (Conradi); but it need scarcely be said, that there are no such direct agents; and that the pathological cause of the suppression or diminution of the discharge must always be appreciated, and combated. Warm fomentations over the uterine region; warm injections into the vagina and rectum; leeches to the labia pudendi or to the inside of the thighs, are amongst the topical remedies which are employed to solicit blood towards the uterine region; but they cannot be proper in all cases; and their employment must be regulated by general principles.

SPECIAL PARTURIFACIENTS.

1. ER'GOTA.—ERGOT.

Ergot, *Secale cornutum*, *Spurred rye*, from French, *ergot*, 'a spur,' is generally considered to be the result of a disease in rye, occurring most frequently when a hot summer succeeds a wet spring. For the various opinions that have been entertained in regard to ergot, the reader is referred to another work (*New Remedies*, 7th edit. p. 327, Philad., 1856). It may be sufficient to state here, that the diseased condition of the grain is occasioned by the growth of a fungus not previously detected, to which has been given the name *Ergotætia* seu *Oïdium abortans* seu *abortifaciens*.

Fig. 109.



Ergotætia abortifaciens.

A. Sporidia. B, C, E, F, G, H. Different modes of reproduction in water. D. Membrane of sporidium, laid open. 1. Fungus, assuming a radiated form, and developing sporidia *a*.

Ergot consists of grains from a third of an inch to an inch and a half long; and from a line to three lines in diameter; usually curved like the spur of a cock, whence the name; having commonly two longitudinal furrows, and being often irregularly cracked and fissured. Externally, it is of a dingy purple hue; internally of a pale grayish red, or grayish white. Its odor is peculiar, fishy, and nauseous; taste obscurely acrid and disagreeable. Unless kept excluded from the air, it swells and softens, acquiring a deep black color, and heavy smell; and becoming infested by a little acarus, which is about one-fourth the size of the mite of cheese, and destroys the interior of the ergot, leaving the grain as a mere shell. In four months, according to Dr. Pereira, seven and a half ounces of fæcal matter of the acarus were formed from seven pounds of ergot.

The powder becomes quickly damp, and full of animalcules. The ergot should therefore be fresh; certainly, it ought not to be kept for more than two years. It is affirmed, that a small piece of camphor kept in the stoppered bottle, which contains it, soon annihilates the whole race of insects, and prevents any fresh formation.

When ergot is examined with the microscope, its internal structure is found to consist of minute roundish cells, many of which contain particles of oil. The bloom, seen at times on its surface, appears to be composed of the sporidia of the fungus to which it is believed, by many, to owe its origin.

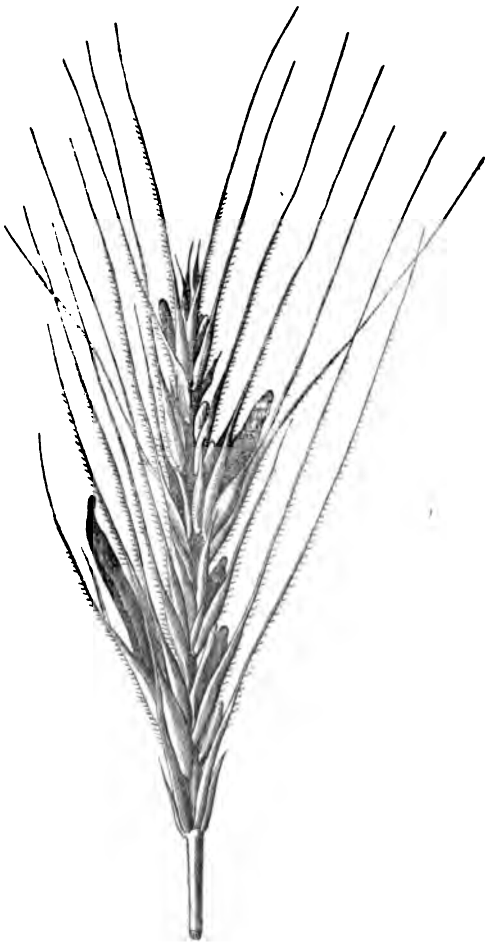
Various analyses have been made of ergot by Vauquelin, Maas, Bonvoisin, Pettenkofer, Winkler, Robert, Wiggers, Legrip, and Wright. The analysis of the last gentleman is considered to be one of the most accurate. He found it to consist, in 100 parts;—of thick white oil, 31·00; osmazome, 5·50; mucilage, 9·00; gluten, 7·00; fungin, 11·40; coloring matter, 3·50; fecula, 26·00; salts, 3·10; loss, 3·50. Dr. Wright considers it to differ from sound rye, chiefly in the presence of oil, osmazome, and fungin.

Ether and the volatile oils remove its active part, which, according to the experiments of Dr. Wright, is the fixed oil, OIL OF ERGOT. This may be readily obtained from the powder by agitation with sulphuric ether, and expulsion of the ether by spontaneous evaporation. Dr. Wright obtains it by digesting ergot in liquor potassæ at a temperature of from 120° to 150°, until a perfect saponaceous mixture is formed. The liquid is then diluted with half its weight of water; is accurately neutralized with sulphuric acid, and subjected to distillation from a salt water or oil bath. The product is white, adhesive, and fatty-looking; almost free from empyreuma, and nearly tasteless.

As it is important to judge between a good and a bad specimen of ergot, Dr. Wright states, that if it be clear and smooth on its surface; not powdery; of a deep purple color; neither entirely black nor light brown; have a full strong odor; break clearly, exhibiting a pink blush internally; be unpunctured by insects; burn with a clear jetting flame, and be of less specific gravity than water, its activity may be trusted.

The effects produced by ergot, when eaten as food, as well as the sedative influence, which it is capable of exerting in various diseases, are referred to elsewhere. The extraordinary property ascribed to it, of assisting the parturient efforts, alone falls under consideration here. This has been long credited in Germany; as the old German names Mutterkorn, "womb grain,"—and Gebärpulver, "parturient powder," and the *Pulvis Parturientis* of the Marburg Pharmacopœia, sufficiently testify. Fifty years ago (1807), a "*Pulvis parturiens*" of ergot was recommended in this country by Dr. Stearns, of Saratoga County, New York, and since that time an immense mass of evidence has been adduced in its favor. Still, there are many who deny it all power over the uterus, both in the unimpregnated and impregnated state; and who affirm, that it acts only indirectly on that viscus through the general disturbance it occasions. Such is the opinion of a modern experimenter, Dr. Jörg, who affirms, as the result of his experiments and observations, that "there is no further connection between these degenerate grains and the uterus, than the word Mutter ('uterus') which is common to both." From his various experiments, Dr. Jörg infers, that ergot, when taken in small doses, produces little or no effect upon the functions; but when fresh dried in an oven, and given in large doses, it oppresses the stomach, occasioning nausea, vomiting, colic, and liquid evacuations; destroys the appetite, and injures the digestive powers; these effects being accompanied by a sense of weight in the head, vertigo, headache, and general torpor of the system. Under these circumstances, he thinks it not difficult to understand, that the connection between the fœtus and the uterus may be modified;

Fig. 110.



Secale cornutum.

and that abortion may ensue. But although, as elsewhere shown, ergot is capable of producing acro-narcotic effects, their supervention is not desired by those who regard it to be possessed of peculiar powers by which it causes contraction of the uterine fibres of the parturient female, and who administer it with that view. When given in appropriate doses, the parturient efforts become more forcible, constant, and almost unremitting; but there is no bodily disorder.

It has been freely administered in this country, as well as in others; and it can scarcely be doubted, that although, in many cases, the uterine efforts might have returned, and probably did return, independently of it,—in the remainder, the ergot must have exerted a special action on that viscus. From the results, therefore, of such cases, it must be admitted, that ergot is possessed of ecbolic properties by which it acts upon the *parturient* uterus; but that it is capable of producing any effect upon the unimpregnated organ, or upon the impregnated at any time except when parturition has commenced, is denied by most observers. The experiments, indeed, of Drs. T. Wright and De Gravina led them to the singular inference, that it appears to have the power of *prolonging* gestation in the guinea-pig and rabbit, when administered for a considerable period. It is proper to add, that in a report made by M. Piorry, to the French *Académie de Médecine*, on a *Mémoire* by M. Arnal, the former only admits, "that there are some probabilities that ergot has an elective action on the uterus of the human female and of animals."

The cases, in which ergot may be given with propriety, are those in which there is insufficiency of uterine effort, either in force or frequency, or both; when the labor is somewhat advanced, and the os uteri moderately dilated; and when there is no mechanical obstacle to delivery occasioned by deformity of the pelvis, rigidity of the os uteri, or preternatural presentation. It should likewise be used with more caution in first pregnancies. It is chiefly employed to increase the expulsive efforts in lingering labors; to hasten delivery on the occurrence of alarming symptoms; to expedite the expulsion of the placenta, when the uterine efforts fail; to facilitate the discharge of clots, hydatids, &c.; to restrain uterine hemorrhage, especially when occurring in the puerperal or gravid state; to facilitate abortion, when it has once commenced; and it has been strongly recommended for the prevention of uterine hemorrhage. In all these cases, the good effects result from the influence of the drug on the uterus in action.

It has been an objection, often urged against ergot, that the number of still-born has been augmented since its introduction; and farther, that observation has shown, whenever it is given to expedite delivery, that more or less danger accrues to the offspring, either by the induction of asphyxia, or of positive death, owing to the violence of the uterine contractions, or to the deleterious agency of the drug on the fœtus. It would not seem, however, that when it is prudently administered, there is sufficient reason for the belief, that it is injurious to the child. Professor Beatty, of Dublin, has affirmed, that when delivery is not effected within two hours after the administration of ergot, the child's life is generally lost; yet the experience of others has not confirmed this. Cases have been published in which from three to six hours have elapsed, and fine healthy living children have been born.

It has been already remarked, that it exerts its properties on the uterus in action. Such is the general opinion; but there are some who think, that it is capable of originating uterine contraction, and of inducing premature labor at any period of utero-gestation; whilst others are disposed to think, that the ecbolic properties of the drug are not exerted upon the impregnated uterus at an early period of utero-gestation; but that, at a certain stage of development, the uterine fibres are capable of being excited by it, so as to expel the fœtus. It would be strange, however, were its agency to be thus restricted.

A few cases of its seemingly good effects in amenorrhœa have been published; few, however, or none, believe it to be possessed of emmenagogue virtues.

Ergot may be given in the form of the fresh powder, in the dose of ten to twenty grains in sugared water; and be repeated every twenty minutes, until the effect upon the uterus is elicited. Von Busch found the best results when it was given in the dose of ten grains every ten or fifteen minutes. In one case, it was requisite to repeat it eight times; in four cases, six times; in twelve, five; in thirty-three, four; and in the remainder of one hundred and seventy-five cases, three and less. The smallest quantity exhibited was a single dose of ten grains. Its action on the uterus commences in some cases as early as seven minutes after its exhibition, whilst in others a much longer period is required. The average time appears to be about ten or fifteen minutes. Dr. Samuel Hardy, of Dublin, states, as the result of his observations, that it has always commenced within twenty-five minutes at the farthest, when the child has been expelled alive; that if a longer time than this has elapsed, instruments have been necessary, and the child has been born dead. The beneficial effect of ergot is evidenced by the pains running into one another without any appreciable interval.

In regard to the most advisable forms of preparation such a difference of sentiment exists as to throw obscurity on the subject. Dr. Wright, it has been seen, regards the fixed oil, left after the evaporation of ether in which ergot has been digested, to be the active matter; and he states, as the result of positive experiment, that it has the same effect in inducing powerful uterine contractions as ergot itself; for which purpose it is given in the dose of twenty to fifty drops in tea, weak spirit and water, some aromatic water, or made into an emulsion with mucilage and syrup. Were such proved to be the case, the oil would be the most advisable form of exhibition; inasmuch as it retains its properties for several years, if kept in well-closed bottles excluded from light.

Frequently, however, ergot is given, by preference, in infusion; but it is not easy to see how the fixed oil can be taken up by hot water. Professor Charles Hooker, of New Haven, who is of opinion that the parturifacient and the narcotic properties may be separated, recommends the clear infusion, which possesses, he conceives, the former property only. The powder, of course, must contain both. Dr. Hooker found that when a quantity of pulverized ergot was macerated for several days in sulphuric ether, and the liquid was evaporated in a glass vessel, until it no longer afforded the smell of ether, there remained at the bottom of the vessel a small quantity of thick heavy oil, resembling in appearance fish-oil; above this was a lighter oil, much more abundant than the former, of a light reddish-brown color, and a sweetish nauseous taste. This light oil was found to be possessed of decidedly narcotic properties; and similar effects resulted from its employment, in some experiments made with it, at the suggestion of the author, by Dr. McKee, of South Carolina, at the time resident physician in the Philadelphia Hospital.

On the other hand, Dr. Lever prepared an ethereal tincture by digesting four ounces of ergot in four fluidounces of ether for several days. This was poured off, evaporated to dryness, and the residue again dissolved in two fluidounces of ether; of which solution, from ♏xv to ♏xxx were given for a dose. It was found to act powerfully on the uterus as a parturifacient; and Dr. Lever remarks, that whilst all the other preparations of ergot not unfrequently induce acro-narcosis, he has not once observed those effects from the use of the *ethereal solution of ergot*—and he therefore thinks that the acro-narcosis is caused by some constituent of the drug, which ether does not dissolve—a view which is irreconcilable with the results of Dr. Hooker's observations. The latter gentleman, in his experiments, employed the lighter portion of the oil of ergot of Dr. Wright. Dr. Lever's preparation was nothing more than a solution of the oil in ether.

When the infusion is employed, it may be made of one drachm of *ergot* to four ounces of *water*, one-third being taken for a dose. When, however, the object is to induce premature labor, much larger doses have been necessary. It has been given until the patient took in one case six drachms, and in another twelve; half a drachm being taken every three to four hours. The plan adopted by Dr. Hardy is to infuse half a drachm of *powdered ergot* in three ounces of *boiling water;* and, after straining, to add ten or fifteen grains of the fresh powder with a little sugar. The dose is repeated in twenty minutes; and if the uterus does not contract well, it is given a third time.

If the active properties reside in fixed oil, the alcoholic tincture ought to be an objectionable preparation; and so it has been regarded.

Occasionally, ergot is given in decoction; one drachm bruised being boiled in six ounces of *water*, for ten minutes, in a lightly covered vessel, and strained. The dose is one-third. (For different forms of preparation, see the author's *New Remedies*, edit. cit. p. 342.)

VINUM ER'GOTÆ, WINE OF ERGOT.—(*Ergot.* contus. ℥ij; *Vini albi* Oj.) This is the only officinal preparation of ergot in the Pharmacopœia of the United States. The dose may be fʒj—fʒij.

2. SODÆ BORAS.—BORATE OF SODA.

Many of the German writers ascribe to borax a specific influence over the uterus; by which it is supposed to favor the catamenial secretion, the pains of parturition, and the lochial discharge, when their failure is dependent upon inactivity of the organ.

It has been recommended strongly, by Dr. Copland, in abortion. "When the embryo only," he remarks, "is expelled, the appendages being still retained, or when the hemorrhage is great, the entire ovum, still remaining in the uterus, the ergot of rye will often prove of inestimable service; and when given in the form of decoction, with as much borax as will dissolve, will seldom disappoint our expectations." As it is prescribed, however, by Dr. Copland, along with an unquestioned parturifacient, doubts may be entertained in regard to its agency in these cases. Of its effects, the author can say nothing from his own experience. It has been advised by one practitioner, Dr. D. Stahl, of Indiana, in dysmenorrhœa occurring in plethoric individuals, after bloodletting had been premised. The dose was nine grains every two hours in flaxseed tea, given for two days before the expected recurrence of the catamenia.

3. GOSSYP'IUM.—COTTON.

The root of *Gossypium herbaceum*, the *Cotton plant*, SEX. SYST. Monadelphia Polyandria, NAT. ORD. Malvaceæ, so common in the southern portions of the United States, is considered by Dr. Bouchell, of Mississippi, to be a valuable emmenagogue, and not inferior to ergot as a parturifacient. He affirms, that it is employed constantly and successfully by the slaves in the South to produce abortion; and he is of opinion that it effects the object without injuring the general health [?]. To aid the parturient efforts he employs it in *decoction* made by boiling four ounces of the inner *bark of the root* in a quart of *water* to a pint. Dose, a wineglassful every twenty or thirty minutes.

A strong decoction is said to be possessed of antiperiodic virtues; and has been prescribed successfully in the South in intermittent fever.

4. EXTRAC'TUM CAN'NABIS.—EXTRACT OF HEMP. (p. 403.)

Indian hemp has been considered by Drs. Christison and Simpson, of Edinburgh, to possess a remarkable power of increasing the force of uterine contraction during labor. As compared with the action of ergot it has seemed to present the following points of difference. *First.* While the effect of ergot does not supervene for some considerable time, that of hemp, if it appears at all, is observed within two or three minutes. *Secondly.* The action of ergot is of a lasting character; that of hemp is confined to a few pains shortly after its administration. *Thirdly.* The action of hemp is more energetic, and perhaps more certainly induced.

It may be given in the form of tincture, from 25 to 35 drops at intervals.

SECTION VI.

AGENTS THAT AFFECT VARIOUS ORGANS.

I. EXCITANTS.

SYNON. *Stimulants.*

Irritation, not debility, the great lethiferous agent—Causes of death in cases of extensive abscess, phthisis pulmonalis, &c.—Debility in one organ may suggest irritation in another—Cases of really diminished action—Division of excitants—Definition of excitants—Carminatives—Chiefly derived from the vegetable kingdom—Simple direct action of excitants—General effect of excitants—Excitement and collapse defined—Excitants act also as revulsives—Therapeutical application of excitants—In gastric and intestinal affections—In fevers—In inflammatory diseases—Catarrhs—In the neuroses, hysteria, epilepsy, paralysis—In topical inflammation—Mental excitants—Special excitants.

ALTHOUGH the doctrine, that debility is the cause of almost every diseased action, is now nearly exploded, there can be no doubt that, owing to morbific agencies, the vital manifestations of a part may be enfeebled; and that a plan of treatment, which will arouse them to greater activity, may occasionally be required. Even so late as the time of Dr. Cullen it was maintained, that the great indication to be followed by the therapeutist, in cases of fever, was to obviate the tendency to debility and death. A better attention to physiology and pathology has shown, that the great lethiferous agent, in such cases, is irritation; and that death often results from this cause, where its agency was at one time altogether unsuspected.

It has often been observed, that where large collections of matter have formed, and been discharged by the surgeon, febrile irritation of the most fatal kind has rapidly supervened; yet little or none of this irritation was present before the matter was evacuated. It was accordingly supposed, at one time, by every surgeon, that the irritative fever was the result of debility induced by its discharge. It is obvious, however, that in such case, from the time that the pus is secreted, it is as extraneous to the vital operations as after its discharge. The removal of that which is already secreted cannot add to the existing debility. The cause of the hectic fever, set up in such cases, and present to some extent from the moment that extensive suppuration begins to be established, reposes on the circumstance, that when once the pus is discharged, a recuperative effort takes place in the cells of nutrition of the inner paries of the cavity; and the severe irritative fever, which follows, is owing to the constitution sympathizing with the local excitement to such a degree, that the system often sinks under the effects of its own reparatory exertions. No one, at the present time, conceives, that the consumptive are worn away by the discharge that takes place from the substance of the lungs. Hectic fever occurs in phthisis pulmonalis, as in every other case where extensive mischief exists, and great recuperative effort has to be exerted; and, under the irritation of this fever, the spark is gradually extinguished.

It is not in these cases only, that the prevalent doctrine of debility has been exploded. The practitioner,—when he observes signs of debility in an organ or in the system generally,—inquires, whether the vital manifestations of other organs may not be exalted; and whether there may not be a source of irritation existing somewhere, which, by detracting from the vital manifestations in other parts, may be the cause of the local or general evidences of asthenia or debility. A strong man, in a state of health, may be attacked with general fever, accompanied by languor and lassitude,—with every sign, indeed, of apparent debility,—yet a very slight examination may exhibit, that an undue quantity or improper quality of diet is exciting gastric irritation, which is the source of all the asthenic phenomena. Again, a man, in a condition of rude health, may be exposed to febrific miasmata; and, in due time, without much previous indisposition, may exhibit appearances of great debility; and, although a short time before he might have been able to raise pounds, he may now be scarcely able to raise as many ounces. Yet, it is difficult to presume, that such debility is real; it is rather dependent upon the excessive irritation in certain parts of the organism detracting from the vital action in others; and the important point for the therapeutist is, to direct his attention to the removal of this irritation, after which the effects—the asthenic feelings and symptoms—may cease also. Accordingly, at the present day, no practitioner, at the commencement of a febrile condition, is deterred from the use of evacuants by symptoms of languor and lassitude,—experience and reflection having sufficiently instructed him, that the proper employment of such agents is adapted to equalize the vital manifestations, by reducing the inordinate action existing in a part of the organism, and thus equalizing the circulatory functions of the whole.

Even in cases of cachexia, where general debility appears to be unequivocally manifested, some lurking mischief is commonly present; and when, in such cases, we find a change of the atmospheric and other influences surrounding the patient productive of benefit, it is owing to the equalizing influence of change of air, society, and scenery, which detracts from the local mischief, and exhibits its genial effects in every part of the frame; hence, the wonderful recoveries we annually witness in chronic diseases from a visit to our trans-Alleghany and other watering places—the waters having often had no agency in the cure; frequently, indeed, not having been used at all. Still, there are conditions of the frame in which the vital activity is depressed below the healthy standard; where the vascular system is in a state of anæmia; the blood less rich in globules and nutritive pabulum, and the solids of loose coherence, so that the blood escapes through them with facility, or they rupture on the slightest mechanical violence;—or where, after violent exaltation of the vital forces, a corresponding depression or state of collapse supervenes. In such cases, excitants, especially those of a more permanent character, may be imperatively demanded.

In the great division of excitants, those agents are usually included whose excitant action is *local*;—in other words, is exerted upon some particular organ or tissue, which they affect by preference. They comprise the class of *local stimulants* of Murray, *local excitants* of others, whose operation is that of simple stimulation of the tissue with which they are placed in immediate contact, extending or not to the rest of the organism, so as to produce augmented action of the nervous and sanguiferous systems.

The classes of medicinal agents, which act as general stimulants, are chiefly—*Excitants*, *Tonics*, and *Astringents;* those that are usually ranked as local stimulants are—*Emetics*, *Cathartics*, *Emmenagogues*, *Parturifacients*, *Diaphoretics*, *Errhines*, *Sialagogues*,[1] *Diuretics*, and *Expectorants*, of all of which the author has treated separately.

Excitants, *Stimulants*, or *Incitants*, may be defined,—agents that increase the organic actions by impressing the contractility of the part to which they are applied,—the excitation, thus induced, being extended, or not, to the rest of the system.

The organ whose contractility is generally selected to be first impressed by excitants is the stomach; although the skin and mucous membranes—especially the Schneiderian and the lining membrane of the rectum—are at times chosen. The extensive sympathy, which exists between the stomach and the rest of the system—particularly the nervous and sanguiferous portions—renders it best adapted for the reception of the impression, which excitants are capable of producing *directly*.

In the classification of Dr. Murray, which is closely followed by Dr. Paris, there is no division of excitants. The latter writer has, indeed, a class of *Aromatics*, which he defines—"Substances of a fragrant smell, which produce upon the organs of taste a peculiar sensation of warmth and pungency, and occasion, when swallowed, a corresponding impulse upon the stomach, which is rapidly communicated to the remote parts of the body;" but this definition is obviously insufficient to embrace the whole class of excitants; as several agents of an exciting character,—caloric and electricity, for example,—can in no wise be regarded as aromatics. Aromatics must be looked upon only as a subdivision of excitants, whose *modus operandi* essentially resembles that of the class.

Of old, aromatics were employed chiefly as 'carminatives,' a subdivision not now admitted, although we still retain the term, which —as before remarked—is derived from *carmen*, 'a verse-charm,' and was introduced at a period of superstition, when magic and incantations were employed, and physiology and pathology scarcely existed.

Carminatives were given to expel flatus from the stomach and intestines; and they afford a good example of excitants, that produce their effect simply on the parts with which they come in immediate contact,—or, at least, without exciting the general system. When flatus accumulates to any extent in the alimentary canal, the muscular fibres become so far distended that atony is produced, and they are incapable of acting with sufficient energy to expel the air, or to diffuse it through the tube; hence, the pain which accompanies such over-distension in flatulent colic. But if, in this case, an aromatic or carminative be administered, the excitement produced by it in the mucous membrane with which it comes in contact is extended, by contiguous sympathy, to the muscular coat, which is aroused to more energetic contraction; and in this way, the flatus is compressed and diffused; a part may escape through the cardiac orifice of the stomach, if that organ has been the seat of the affection; or it may descend into the lower intestines. The older writers, not being able to comprehend how the sudden relief was accomplished in such cases, styled its operation *carminative* or like that of a *carmen* or charm.

Most excitants are derived from the vegetable kingdom, and the property on which their virtues are dependent, is usually volatile oil, or some analogous principle; hence the action, and form of administration of vegetable excitants afford but little difficulty to the student. In the generality, indeed, the active principle—volatile oil—is separated by distillation, and is administered in that form, so that the plants and their products, whence the oil has been derived, are but little used in therapeutics. This is the case with *caraway*, *aniseed*, *lavender*, the *mints*, *cinnamon*, *cloves*, *nutmeg*, &c. In other cases the oil is rarely separated, as in *calamus*, *ginger*, wood of *sassafras*, &c. Here, the sole care consists in not applying heat to such an extent as to drive off the volatile oil; and accordingly those agents are either given in substance, or infusion,—not in decoction or extract.

The excitants, that are derived from the inorganic kingdom, exert their agency in various ways. They have no principle in common to which their operation can be referred.

The case of flatulent colic is one in which the simple direct action of excitants is indicated; and it is manifest, that similar principles would lead to their adoption in affections of the stomach dependent upon debility of its muscular coat,—as indicated by flatulence, sense of distension, &c., unaccompanied by inflammatory or other irritation in the lining membrane. Accordingly, it is, and has been, a common custom with all nations, to use some alcoholic excitant after food difficult of digestion has been taken.

That, which applies to food difficult of digestion, applies likewise to the cases above referred to, in which the digestive powers are enfeebled; and to those especially where the defect lies in want of due contractility in the muscular fibres of the stomach and small intestines,—particularly of the former. When hot water or diluted alcohol—pure, or medicated—is taken into the stomach, it produces two effects. It stimulates the mucous membrane to an increased secretion of those fluids, that are inservient to digestion; and by contiguous sympathy, the muscular fibres are aroused to greater activity, so that the contraction of the organ upon its contents is more marked;—hence the eructation, which follows the use of those excitants, and the absence of uneasy feelings of distension, which might have been experienced had they been withheld. Alcoholic liquors, moreover, have a chemical operation, not possessed by ordinary excitants. They coagulate the albuminous matters in the stomach; and may thus aid in giving the contents of the organ a texture better adapted for the accomplishment of digestion. But occasion will be afforded to refer to the particular examples of local stimulation, when the consideration of the therapeutical application of excitants occurs. At present, it is necessary to inquire into the general effects produced by them, when their action is not restricted to the part with which they come in contact, and when the object of the practitioner is to exhibit them so as to affect the whole system.

The nervous susceptibility is, in such case, greatly augmented; the action of the moving fibres is increased; the pulse rendered more frequent and forcible; and the function of calorification excited,—provided the quantity of the agent be great, or its powers considerable. These effects must obviously require a larger dose of the excitant than where the object of the practitioner is merely to produce local stimulation. The very different effects of excitants, according to the quantity administered, is a circumstance of great interest to the practitioner. A small dose may stimulate the lining membrane of the stomach to a greater secretion of the digestive fluids, and the muscular fibres to greater activity; so that the food may be digested more readily and rapidly; chylosis be facilitated; the blood move with greater rapidity in the vessels; and the various secretions and excretions be more readily effected; but, if the dose be carried far beyond this, irritation may be excited in the part with which the excitant comes in contact, or true inflammation may result, so that a general febrile condition may be induced, under which many of the functions enumerated, instead of being facilitated, may be retarded—especially the secretions and excretions, which are never properly accomplished during fever. These, however, are the results of too strong a dose. The quantity, by careful attention, may be so tempered, that nothing but a salutary excitation may supervene; and this constitutes one of the great difficulties in the proper therapeutical employment of this class of agents.

There is another important consequence of stimulating the whole, or any part, of the organism beyond the due point,—that a corresponding state of depression succeeds; so that, after violent excitation, collapse or almost total prostration may ensue. This kind of compensation of action appears to exist to a great extent in the organism. If any organ be greatly over-excited, other organs may be observed to be struck with debility; and hence it is, as we have seen, that the judicious pathologist—when he observes want of action, or apparent atony, in an organ—carefully investigates, whether the deficiency of vital manifestation may not be compensated by inordinate action elsewhere.

This supervention of collapse on over-excitement renders it a matter of moment to be able to determine what are the healthy manifestations by which the evidences of exaltation or of diminution of the vital forces may be determined. This is not an easy matter; and the difficulty is greater in some individuals than in others. No two persons have the functions of circulation, innervation, and calorification alike. Dr. A. T. Thomson has attempted a solution of the question, by affirming, that "*excitement* implies every state of the nervous system in which the energy of the brain is greater than that, which, in the waking state of a healthy man, is exactly adequate to the ordinary functions of the system: *Collapse*, that state in which the cerebral energy is so much diminished as to suspend the exercise of the functions of sense and volition—a state of defective activity of the brain, similar to that which causes sleep, only in an augmented degree. There can be no doubt, that a certain supply of blood to the brain is essential for the support and continuance of its functions; too great an increase of the momentum produces *excitement;* a diminished afflux, on the contrary, within certain limits, or an exhaustion of the moving powers from previous over-exertion, is productive of *collapse.*"

But these definitions do not solve the difficulty. The constitutions of individuals differ so much, that we cannot easily determine what are the healthy manifestations in any particular persons. Whenever, therefore, excitants appear to be indicated in disease, the therapeutist has to be cautious not to carry the excitation too far, lest the vital energies should be impaired or worn out; and for the like reason it becomes important, when once the use of excitants has been commenced, that they should be withdrawn with caution, lest a state of collapse or of diminished action should succeed, proportionate to the preceding stimulation. This is especially demanded in protracted fevers, in which excitants may have been employed with propriety.

The state of collapse, referred to above as supervening on over-excitement, differs essentially from that which attends spasmodic cholera. In this fatal malady, owing to the morbid state of the lining membrane of the intestines, the watery portions of the blood are largely exhaled, and passed off in the evacuations; until, ultimately, it becomes too thick to circulate in the extreme vessels; the nervous system does not receive its due supply of blood possessing the requisite properties, and even the central organ of the circulation, and the whole circulatory apparatus, have their functions impaired, and ultimately annihilated. This state of collapse is not, however, the immediate consequence of previous general excitement.

It will be seen hereafter,.that all tonics are excitants; but that the *former* do not stimulate beyond the healthy standard, and are more permanent in their action: whilst the *latter* are always employed to excite more or less beyond the healthy degree; and are more transient in their operation, although their effects may be more speedily exerted.

A valuable mode, in which some of the agents belonging to this class of medicines exert their efficacy, is by revulsion. The whole class of counter-irritants and epispastics are properly excitants;—but their intimate examination will be entered upon under a distinct head. (See REVELLENTS.) Mercury and caloric are also employed with this view in disease; but the consideration of the *modus operandi* of the former when pushed so far as to affect the system, will also fall in another place. (See EUTROPHICS.)

The catalogue of the Materia Medica furnishes us with a liberal choice of excitants; yet, so large a portion of them essentially resemble each other in their properties, that the list might be much diminished without any disadvantage to science or humanity. There is scarcely an aromatic vegetable, the essential oil of which has not been admitted into the pharmacopœias of Europe or of this country; although almost any one of them might be selected as a fit representative of the whole.

Therapeutical Application of Excitants.

Gastric affections.—In the therapeutical application of the class of excitants we have always to reflect, whether the indication be simply to effect a local stimulation, or to have the stimulation extended to the general system; whether, in other words, it be merely a morbid condition of the digestive functions, that has to be combated; or one involving the great systems,—nervous, vascular or secretory.

Where the mischief is purely gastric and dependent apparently on want of tone in the muscular coat of the stomach, or in the viscus generally, the diffusible excitants are chosen, if the uneasiness be urgent—as where *flatus* is present. Ether, alcoholic liquors, hot water, essential oils, &c., may be employed with this view, but any stimulation, thus induced, can only be momentary; the cause of the uneasy symptoms may still persist, and demand a treatment more permanent in its influence. Correct pathology may suggest, that in such cases recourse should be had to a combination of tonics and excitants, in order that, whilst the latter palliates the uneasy feelings, the former may radically remove the want of tone that gave origin to them. Accordingly, one of the bitter roots or barks is usually given in infusion, along with some aromatic;—the bitter principle of the root or bark exerting its tonic influence, whilst the essential oil of the aromatic acts as an excitant. Care, however, must be taken to discover, whether the symptoms are really produced by atony; for there is a variety of *dyspepsia*—indicated, at times, by pain of the epigastrium on pressure; by gastric uneasiness, when hot or cold fluids are taken; by dryness and redness of the tongue; dryness and heat of skin; with, sometimes, quickness of pulse, which consists, as the symptoms sufficiently indicate, in an irritated or inflamed condition of the gastro-enteric mucous membrane; and in which, of course, the stimulant plan of treatment would be injurious. This very condition of mucous membrane may, indeed, be induced by the incautious use of excitants. It has been already remarked, that excitation is followed by corresponding depression; and that excitants, in an overdose, exalt inordinately the vital energies of the part with which they come in contact; so that if this course be persevered in, the irregular condition of the mucous surface—as to alternate excitation and depression—can scarcely fail to eventuate in irritation, if not in inflammation; hence it is, that excitants alone are rarely used in affections of the digestive tube, unless for the removal of sudden attacks of disease, as of *flatulent colic*, especially in children, when a few drops of any essential oil usually dispel the mischief.

In persons of the gouty diathesis, and occasionally in others, violent attacks of a spasmodic character implicate the stomach, causing the most excruciating pain, aggravated at intervals; but with no signs whatever of inflammatory excitement. In such cases, a new action must be produced in the nerves of the organ, by the administration of the most diffusible excitants—combined, or not, with narcotics—until relief is procured. The latter class of remedies affords us the most efficacious agents in these affections, and accordingly more trust is reposed in them. Ginger, capsicum, ammonia, ether, &c., are the excitants usually had recourse to in these cases; and their effect is often aided by the application of stimulants to the epigastric region, which operate by exciting a new action in the nerves with which they are placed in direct contact; and thus detract from the erethism in the nerves distributed to the stomach. This kind of revulsive impression or new action is, indeed, a main cause of the good effects derived from the administration of pure antispasmodics in diseases of a spasmodic nature.

In cases of great *irritability of stomach*, especially in the vomiting of pregnant females, which sometimes proceeds to a distressing extent, a genial influence is exerted on the stomach by the new action, which gentle excitants occasion. Even the mild stimulation, afforded by carbonic acid contained in mineral water, or extricated during the effervescence produced by the union of tartaric acid and carbonate of soda, often affords marked relief; and, in the worst cases, the exhibition of diffusible excitants, with the application of a sinapism or other excitant externally, hardly fails to palliate—if not to radically remove—the irritability of the organ, when only functionally deranged; for it need scarcely be said, that when organic mischief exists; when inflammation, common or specific, or its consequences, are the cause of the vomiting, these agents not only fail in affording relief, but internal excitants may be positively noxious. In such cases, the efforts of the practitioner are restricted to the use of narcotics as palliatives, and to the external application of excitants as counter-irritants.

Constipation.—In like manner, in cases of constipation unattended with inflammation, and, on the contrary, accompanied by great torpor of the digestive function, the addition of an aromatic excitant to a cathartic is beneficial, by stimulating the muscular through the mucous coat; whilst it may act as a corrigent, if the cathartic have any griping quality, by aiding its passage through the intestinal canal, in the mode already described.

Fever.—It need scarcely be said, that excitants must be employed with caution in fever. At one time—as before remarked—the great indication in these affections was supposed to be, to obviate the tendency to debility and death; and accordingly, antiphlogistics, especially of the depleting kind, were used with great hesitation, and everything was done to husband the strength so as to permit the patient to bear up in the latter stages. A better system now prevails; and it is universally admitted, that few, if any, die from febrile debility, and that the fatal influence is seated in the over-irritation of some tissue or tissues, under which the patient gradually succumbs. The efforts of the practitioner are, therefore, properly directed to the prevention of irregular action in organs; and to the removal of irritation or inflammation, wherever existent. Under this philosophical treatment of fever, excitants are, of course, never employed during the early periods; and it is only when the powers of life begin to flag, that a question can arise as to the propriety of their adoption. Even in the very lowest stages of the worst grades of typhus, this question is not always very easily settled. There is generally more or less local irritation present—often in the lining membrane of the stomach and intestines—and many of the signs of debility are dependent upon the depressing influence exerted on other functions by the predominance of irritation there.

This depressing influence on the sanguiferous system of apparently slight but really serious morbid conditions is often singularly evinced in diseases of the intestinal canal, especially such as affect the lining membrane; and particularly in cholera. The author attended, with his friend, Professor N. R. Smith, of the University of Maryland, one of the students, who, after having been present in the evening at the lecture of the Professor of Obstetrics, was attacked with violent vomiting, but without any abdominal or other uneasiness. On the following morning, there was slight tenderness on pressure; and the vomiting persisted. He was cupped over the abdomen, although neither the state of the pulse, nor of the skin, nor the other phenomena, appeared to indicate inflammatory action. During the day, he gradually sank, and expired the same evening. On examining the body, a portion of the ileum was found contracted for the space of several inches; but this contraction had formed gradually. The lining membrane exhibited but slight signs of irritation.

There is something extremely unaccountable in these cases. The peristole of the digestive tube is but indirectly influenced by the brain and spinal marrow. The heart itself is equally abstracted from direct cerebro-spinal influence, and, indeed, from almost all nervous influence; yet, in enteritis, the whole circulatory apparatus is oppressed, as it were; and this oppression, if not removed, rapidly terminates in collapse; whilst, in the comparatively harmless disease—*amygdalitis*, or inflammatory sore throat—the action of the heart is inordinately excited, and the whole vascular system thrown into violent turmoil.

It is generally considered proper to have recourse to excitants in fever, when the pulse and the beat of the heart become feeble and fluttering; the tongue moist perhaps, but with a dark fur; the teeth covered with sordes; the skin bathed in a cold, clammy sweat; or, if hot and dry, with concomitant symptoms of debility, as sinking down in the bed; low muttering delirium; the tongue tremulous, and protruded with difficulty,—indicating great debility of the nervous system; petechiæ or vibices, produced by transudation of blood rendered thin by disease through the loosened parietes of vessels, &c. &c. But it is impossible to lay down any positive rules for the guidance of the practitioner; and it is better that he should even allow the signs of prostration to become marked, before he passes to the too early use—as it may prove to be—of excitants. Dr. Rush, as before remarked (p. 78), considered, that there was a period in fevers, at which blisters might be applied as excitants with great advantage; but, if used before this period, they would be productive of mischief. It is impossible to fix upon such point with accuracy; and in this the main difficulty consists. If it could be decided by any specific phenomena, it would be but necessary to adopt either the antiphlogistic or the excitant medication accordingly. Vesicants are, however, by no means the best agents to be employed as excitants. In the low conditions of the frame, in which they are conceived to be indicated, the discharge of a quantity of the serous part of the blood cannot fail to add to the debility more than the excitant property can detract from it. They produce, moreover, excessive irritation; and are, withal, transient in their operation. A more permanent excitant, as wine, is better adapted for such cases, the quantity being carefully regulated so as not to stimulate beyond the due degree.

Under another head, it will be seen, that epispastics may be employed with decided advantage in fever, but not on the principle of inducing general excitation. (See Revellents.)

Whenever excitants are esteemed necessary in fever, the fact, before adverted to, must be borne in mind,—that their operation is apt to be followed by corresponding depression. They should be administered, consequently, so frequently, that depression has not time to supervene,—care being taken, that they are not given in such doses as to excite beyond the proper point; and, if their operation be salutary, they will be found to detract from, rather than add to, the febrile irritation: if, however, the febrile symptoms should be manifestly increased under their administration, they must be discontinued—but discontinued gradually—for the reasons mentioned.

These general views will afford some guidance to the use of excitants in febrile complaints in general. The author has already said, that in such affections they are but little needed, and that they must, in all cases, be employed with a wise caution. The case, indeed, must be sufficiently hopeless, in which the elasticity of the frame is incapable of restoring it to its wonted energies without their agency; and very often—too often—when they are determined upon, they occasion, at the most, a slight flickering of the flame prior to its total extinction. It is a common argument in favor of the administration of excitants, that it is the duty of the practitioner to support the patient as long as life lasts; and the belief is almost universal, that existence can be prolonged by the free use of stimulants; but this is questionable. There is, in these extreme cases, but a small amount of excitability remaining in the organism; and this, it appears to him, may be sooner exhausted by excitants; so that the patient may absolutely die more speedily under the use of agents administered with the view of protracting his existence.

Inflammation.—What has been said of the impropriety of excitants in febrile, applies equally to inflammatory, diseases. They are positively improper in acute inflammations of internal organs of every kind. This, at least, is a general rule to which we ought to be cautious of admitting exceptions. Some surgeons are in the habit of administering copaiba and cubebs during the inflammatory periods of gonorrhœa virulenta; and, they assert, with full success. In the experience of others, these agents have not been as successful, or as innocuous. Something may and does depend upon the peculiarity of the inflammation of mucous membranes, to which the author has referred, and will have, again and again, to advert. His experience in these cases, and it has not been limited, leads him to treat the disease by antiphlogistics, especially in its early stages; and he has always found the plan successful. There is, however, a condition in these *catarrhs*,—as inflammations of the mucous membranes in general are often designated by the French pathologists,—in which excitants may be administered with advantage. This is when the violence of the inflammation has subsided; and when a discharge is still kept up, owing to the atonic or asthenic condition of the over-distended extreme vessels;—hence, in the state of chronic inflammation of the intestines, that constitutes the latter stages of acute dysentery, or in the after stages of diarrhœa, excitants may often be used with benefit; but in such case recourse is generally had to those that belong to another class of medicinal agents,—astringents. In bronchitis, too, especially in the variety which affects old people, and which was at one time called *catarrhus senilis*, excitants are employed with advantage, especially in the form of inhalation. In this way they come in contact with the vessels implicated.

Hypertrophy of the heart.—When hypertrophy of the heart exists —as indicated by strong impulse, diminished sound, dulness on percussion, and other signs afforded by auscultation—excitants are, of course, improper. Modern pathology has shown, that where such a condition of the organ is present, tendency is laid to hyperæmia of the encephalon; hence, vertigo, depravation of vision, cephalalgia, &c., are its frequent attendants. There are, indeed, no morbid states of the heart, and none of the bloodvessels,—except such as are indicated by over-distension of the subcutaneous veins, and but few cases of these,—in which excitants can be employed with propriety.

Neuroses.—In some of the neuroses, excitants are demanded, but they must be used with caution.

Delirium tremens, in its severe forms, has been considered, by some, to imperiously demand the employment of powerful alcoholic excitants; but, as the author has shown hereafter, they are by no means indispensable; and the disease admits of cure without the use of any of them. (See the article *Alcohol*, under Special Excitants.)

In *hysteria*, excitants are frequently administered for the purpose of exciting a new impression. The disease is manifestly neuropathic; and is usually dependent upon great excitability of the cerebro-spinal nervous system. The object of the practitioner is to break in upon this morbid irregularity of action by making a powerful impression elsewhere. (See Antispasmodics.)

In *epilepsy*, *chorea*, *tetanus*, *neuralgia*, *&c.*, we have but rarely recourse to excitants; because the nature of the diseased action requires a more permanent medication, which tonics are better able to effect. There may, indeed, be cases,—as in every other class of diseases, in which they are generally to be avoided,—that may require their administration; but all this must be decided on general principles.

Paralysis.—Perhaps there is no neuropathic affection, in which the whole train of symptoms would appear to suggest the administration of excitants more than paralysis. The name (from παραλυω, "I relax"), and the phenomena convey the idea of loss of power; and it might appear that in all cases attempts should be made to restore it by the use of excitants. They cannot always, however, be used with perfect safety. Paralysis is often, if not usually, induced by a hyperæmic condition of the encephalon, or of some portion of the cerebro-spinal axis, ending in hemorrhage; and although the state of hyperæmia may disappear, the clot be absorbed, and the *resolutio nervorum*,—as it was once called—continue, excitants, if incautiously exhibited, may endanger the recurrence of the hyperæmia, and thus give occasion to another attack of the disease. Of course, the nearer to the period of the paralytic seizure, the greater the mischief likely to ensue from the injudicious employment of this system of medication.

Yet although the incautious use of excitants has to be avoided in cases of paralysis, their careful administration is occasionally productive of much benefit in *hemiplegia*, *paraplegia*, and in cases of *partial palsy*—of that caused by the poison of lead, for example. The whole class of epispastics is here much employed. Electricity and galvanism, acupuncturation, moxa, &c., are applied to arouse the paralyzed nerves to action; and friction is recommended, along with the internal use of excitants,—such as affect the cerebro-spinal axis more particularly. With this view nux vomica, and especially its active principle—strychnia—have been exhibited; and in a few cases apparently with partial success. It has been shown, that when this energetic agent is taken for a due time, and in an appropriate dose, it occasions tetanic convulsions in the muscles to which the paralyzed nerves are distributed; and consequently it seems well adapted for exciting a salutary stimulation in these cases (p. 417). Too often, however, the cause of paralysis, seated as it is in the cerebro-spinal axis, baffles every effort for its removal, and is far beyond the reach of excitants—either internal or external. It ought not, indeed, to be expected, that the latter could have much influence. Friction, so often employed, blisters and other external irritants, can only exert their primary action on the parts secondarily affected. In this way, the encephalon, it is true, may receive the excitant irradiations, but the effect cannot be great; and, accordingly, external excitants are not regarded as efficacious agents in these diseases.

In the paralysis of the seventh pair of nerves distributed to the face,—as it is, generally perhaps, local, rarely encephalic, and therefore, of comparatively favorable prognosis,—the class of excitants may be had recourse to, with much prospect of advantage.

Local inflammation.—In many cases of local inflammation, seated on the surface of the body, and affecting the skin more especially, the application of excitants is often of unequivocal efficacy. It has long been a custom to expose a burnt part to the radiation of heat, or to hot lotions; and the success of the recommendation is often signal. Shakspeare alludes to the practice, and to the fancied law of the economy, in his "*Romeo and Juliet.*"

> "Tut, man! one fire burns out another's burning:
> One pain is lessened by another's anguish:
> Turn giddy and be holp by backward turning;
> One desperate grief cures with another's languish.
> Take then some new infection to thy eye,
> And the rank poison of the old will die."
>
> *Romeo and Juliet*, Act I, Scene II.

In like manner, in *paronychia* or whitlow, especially when superficial, the pain and inflammation are relieved by lotions of hot alcohol or hot vinegar; and we have examples of the same *modus operandi* in the influence of capsicum and other stimulating gargles in *inflammatory sore throat;*—of stimulating applications in *pernio* or *chilblain;* of hot lotions in *mastitis;* of *oil of lemon* dropped upon the inflamed conjunctiva, &c. It has been before shown, that in the inflammations of the dermoid system—cutaneous or mucous—as a general rule, the over-distended state of the capillary vessel predominates over the excitation of the bloodvessel communicating with it, and that the capillaries are in a state of hyperæmia, which occasions the motion of the blood through them to be retarded; and, at times, to be absolutely arrested. Anything, consequently, that will stimulate the over-dilated capillaries to resume their wonted calibre, may remove the cause of the excited state of the vessels communicating with them; and consequently put a stop to the inflammation. We may thus account for the good effects of blisters in whitlow, and in cutaneous inflammation. Occasionally, too, excitants are employed to diminish the sensibility of particular nerves,—as in *toothache.* For this purpose, the strongest essential oils,—as oil of origanum, or oil of cloves,—are introduced into the hollow of the tooth, so as to come in contact with the exposed nerve.

Friction is an excitant application, which is employed, especially after the use of the cold bath, to induce reaction. It is also used to modify the action of the vessels of nutrition, and to occasion the absorption of effused or secreted matter; but, in this point of view, its effect is eutrophic; and will, therefore, engage attention in another place. (See EUTROPHICS.)

Surgical affections.—In the hands of the surgeon, excitants are valuable agents. He employs them for inducing a new action in *indolent ulcers*, and for exciting the action of the absorbents to take up parts that have been deposited. It is with this view, that white sugar is blown into the eye in cases of specks of the cornea. (See *Saccharum*, under REVELLENTS.) It has likewise been recommended to be inhaled, finely pulverized, to aid in the disengagement of the adventitious membrane, formed in cases of diphtheritis of the mucous membrane of the trachea. For the like purpose, certain astringents are occasionally employed.

Lastly:—to the class of MENTAL EXCITANTS belong certain emotions, whose effects on the economy are not less marked than those produced by physical agents.

It has been the custom to separate the various emotions into two divisions,—the *exciting* and the *depressing*,—an arrangement which, in some measure, expresses the effects on the system that they are respectively capable of inducing. There is, however, as has been properly remarked by Dr. A. T. Thomson, a difference amongst excitants in the degree to which they stimulate the different functions. Some excite but little; and their action is more permanent, and not followed by the depression which supervenes on the use of the more powerful. They, therefore, belong rather to the class of *tonics*. The writer just referred to, places, in the list of mental excitants, *joy* and *impetuosity*,—emotions, which, it will be generally agreed, belong properly to this division of therapeutical agents. There is not a general effect, which follows the administration of physical excitants, that these mental agents are not capable of inducing. It is obviously difficult, however, to have recourse to joy as a remedial agent. It has happened, that the communication of glad tidings has had the most salutary effect upon the hypochondriac, and the melancholic; but the remedy is not easy of application, and the effect must be transient. Excessive joy may even arrest the functions of the brain; and there are cases on record, in which death has followed so rapidly on the emotion as to suggest the same *ratio moriendi* as in death from lightning,—the sudden shock to the nervous system being too great for the vital functions to withstand.

Allied to joy is a cheerful disposition,—*hilarity*, and its accompaniment *laughter*. Every therapeutist has observed the aid, which such a disposition affords to the invalid, and the injurious influence of depressing emotions. At the same time, care must be taken not to allow buoyancy of spirits to lead the individual into imprudence, and to indulge to too great a degree in mental excitement. The stimulus, communicated to the whole frame in this way, where there is a tendency to irregularity of nervous or vascular action, is apt to lead to hyperæmia in some organ, and in this way induce unpleasant consequences. In febrile affections, and in the state of irritability that occasionally exists for some days after delivery, the excitation occasioned by exhilarating conversation, and the fatigue thus induced, react injuriously in many cases; and the wise therapeutist is careful to enjoin both mental and corporeal quietude, until the vital functions are more regularly exerted, and less liable to be deranged by excitant or other influences.

When mirth is accompanied with laughter, we have, in addition to the excitant effects, derangements of another kind induced, provided the laughter be immoderate or unduly protracted. Laughing is a convulsive action of the muscles of respiration and of the voice. It consists of a succession of short, sonorous expirations. The air is first inspired, so as to fill the lungs. To this, short interrupted expirations succeed, caused by convulsive contractions of the diaphragm; and in very violent laughter, the respiratory muscles are thrown into such forcible contraction, that the hands are compelled to be applied to the sides to support them. The convulsive action of the chest interferes with the circulation of the blood in the lungs; that fluid, consequently, stagnates in the upper part of the body; and the face becomes suffused.

From this explanation of the physiology of laughter, it can be understood how injurious it may be, when immoderately indulged, to those who are predisposed to apoplexy, of which it may be, in this way, occasionally an exciting cause. It is a symptom, likewise, in hysteria; and, in the hysterical, is apt to induce a paroxysm, if carried to too great a length; but, on the other hand, in cases in which the functions of the abdominal viscera are torpid; where asthenic dyspepsia is present; or constipation, arising from a like cause; or where the secretion from the liver is not properly effected, gentle laughter is a useful agent. It impresses a salutary succussion on those organs; excites them from their condition of torpor; improves chylosis, and the digestive function generally; and is inservient to the due nutrition of every part of the frame. Hence the old proverb—"*laugh and grow fat*"—which, like most proverbs, is in some degree bottomed in reason.

Impetuosity, in which we include rage, or any sudden and intense mental excitement of any kind, acts like joy, which might, indeed, have been considered, with propriety, under the head of impetuosity. All the bad effects, described as likely to be induced by joy, may follow it; and many are the cases of chronic diseases of the heart and lungs, in which a sudden burst of passion has at once closed the earthly career of the sufferer.

We know that although the heart does not appear to be directly influenced by either the brain or spinal marrow, its irritability is considerably affected by the various emotions; and when these are violent, and the organ is in a morbid condition, the effect on the irritability is so great, that its action may cease, and there may not be a sufficient degree of reaction for it to resume its functions. Where the valves of the heart have been diseased, the fatal event has occurred at once under the influence of powerful mental excitement.

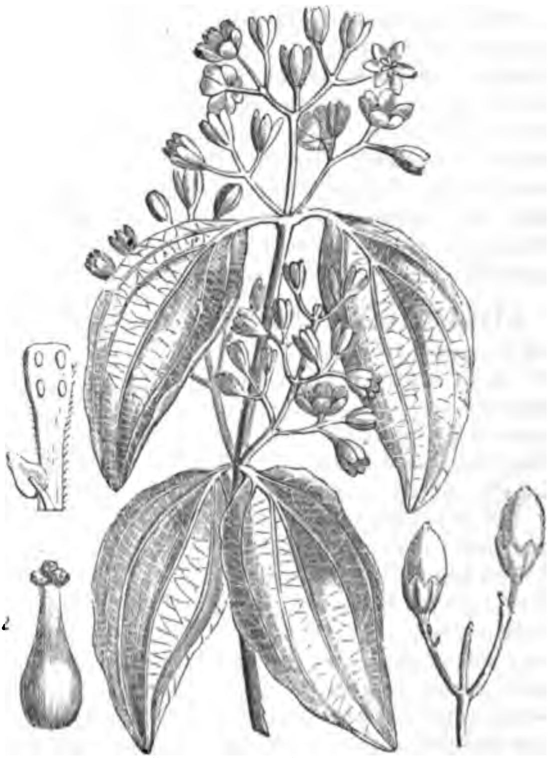
Such are the chief therapeutical properties of the class of Excitants. The next class, which will be considered, does not differ essentially in intimate operation from them. Tonics are, however, capable of being administered, when excitants cannot without danger of injurious consequences: occasionally, also, they are given with excitants, when the object is to produce more stimulation than pure tonics are capable of effecting.

SPECIAL EXCITANTS.

1. CINNAMO'MUM.—CIN'NAMON.

Cinnamon is the bark of *Cinnamomum Zeylanicum* and *C. aromaticum;* SEX. SYST. Enneandria Monogynia; NAT. ORD. Lauraceæ (Lindley), which are cultivated chiefly in Ceylon and Java, and likewise in the Isle of France, Bourbon, the Cape de Verds, Brazil, Cayenne, several of the West India Islands, and Egypt. In the cinnamon gardens of Ceylon, the bark is obtained from the three year old branches, which are lopped off, and peeled,—the peeling being effected by making two opposite—or, when the branch is thick, three or four longitudinal—incisions, and then elevating the bark by introducing the peeling-knife beneath it.

Fig. 111.



Cinnamomum Zeylanicum.

1. Perfect Stamen, with an abortive one at base. 2. Pistil. 3. Fruit.

By far the greater part of the cinnamon brought to this country is said to be imported from China: this is entered at the custom-house as *Cassia*, whilst the same article brought from other sources is said to be almost uniformly entered as *Cinnamon.* By an examination of the Treasury returns from the year 1820 to 1829, it appears, that the average annual import of this spice was, in round numbers, 652,000 lbs. from China; 12,000 lbs. from England; 9,000 lbs. from the British East Indies; 3,000 lbs. from the West Indies, and an insignificant quantity from all other places, with the exception of 12,758 pounds brought in one year from the Philippines. (Wood and Bache.) It would appear that in England, the consumption of cassia is much greater than that of cinnamon: in 1838, the quantity of cassia on which the duty of 6*d.* per pound was paid, was, according to Dr. Pereira, 88,971 pounds; whilst that of cinnamon was 16,605 pounds.

Ceylon cinnamon has an aromatic odor, and a pleasantly pungent sweetish taste, which is dependent upon its essential oil. Its color is a light yellow brown. The pieces are quilled within each other, and some of them not thicker than paper: they are pliable, and have a splintery fracture, especially in the longitudinal direction.

Chinese cinnamon or cassia resembles Ceylon cinnamon in many respects. The odor and taste are similar, but not so delicate and agreeable. The quills, too, are coarser, and in single tubes. It is not, however, always quilled. It is, also, of a darker color than the finest of the East India Company's cinnamon; and it is thicker, rougher, denser, and breaks with a shorter fracture. It is the kind of cinnamon generally kept in the shops of the United States; possesses all the virtues of the finer cinnamons, and on account of its being much cheaper is to be preferred.

The medicinal properties of cinnamon being dependent upon its essential oil, they are readily yielded, to alcohol; and, to a certain extent, to water. Like the other spices, they are excitant; and, accordingly, an *infusion* of cinnamon—*cinnamon tea*—is sometimes given in flatulence as a carminative, and wherever an agreeable aromatic is needed. It is rarely administered alone; but forms part of numerous officinal preparations, to which it is added, either to render the preparation more agreeable, or to aid in the action of the principal, and perhaps less agreeable, ingredients. The dose of cinnamon in powder is from ten grains to a scruple.

O'LEUM CINNAMO'MI, OIL OF CIN'NAMON.—This is the volatile oil of the bark of *Cinnamomum Zeylanicum*, and *C. aromaticum*. It is not distilled in this country, and is, therefore, placed amongst the articles of the materia medica in the Pharmacopœia of the United States. It is imported altogether from the East. An inferior oil is obtained from the Chinese cinnamon, which is called OIL OF CASSIA, and is said to be frequently mixed with oil of cinnamon.

Oil of cinnamon has the odor of the bark; and its taste is pungent and hot; it is of a pale yellow color, and sinks in water. It is soluble in alcohol, with which it is said to be frequently adulterated, as well as with fixed oil. It has all the medical properties of the bark; and is used in the same cases as the other essential oils—especially in gastrodynia, and enteralgia arising from flatulence. It is added, also, as an adjuvant to other medicines. As a powerful excitant it is sometimes used to allay the pain of dental caries, being inserted into the hollow of the tooth. The dose is ♏i to ♏iij, dropped on sugar.

AQUA CINNAMO'MI, CIN'NAMON WATER.—(*Ol. cinnam.* fʒss; *Magnes. carbonat.* ℥ss; *Aquæ destillatæ* Oij.) Cinnamon water is chiefly used as a vehicle for other medicines; but it is sometimes prescribed alone as a carminative.

PULVIS AROMAT'ICUS, AROMAT'IC POWDER; *Pulvis Cinnamomi compositus.*—(*Cinnam.*, *Zingib.* āā ℥ij; *Cardam.*, *Myristicæ*, āā ℥j.) Dose, as a carminative, from gr. x to xx; but it is chiefly used as an adjuvant or corrigent to other agents.

TINCTU'RA CINNAMO'MI, TINCTURE OF CIN'NAMON.—(*Cinnam.* contus ℥iij; *Alcohol. dilut.* Oij. It may also be prepared by the process of displacement.) Tincture of Cinnamon is used as a carminative alone; but it is more commonly added to tonic and astringent mixtures. Dose, fʒj to fʒiij.

TINCTU'RA CINNAMO'MI COMPOS'ITA, COMPOUND TINCTURE OF CIN'NAMON.—(*Cinnam.* contus. ℥j; *Cardamom.* contus. ℥ss; *Zingib.* contus. ʒiij;

Alcohol. dilut. Oij. It may, likewise, be prepared by the process of displacement.) Used in the same cases as the simple tincture. Dose, f℥j to f℥iij.

CONFEC'TIO AROMAT'ICA, AROMAT'IC CONFEC'TION.—(*Pulv. aromat.* ℥vss; *Croci* pulv. ℥ss; *Syrup. aurant. corticis* ℥vj; *Mellis despumat.* ℥ij.) Aromatic confection possesses the excitant virtues of the ingredients that enter into its composition, and is adapted for cases in which a carminative is needed. It is used, also, as a vehicle for the exhibition of certain tonics—such as the subcarbonate of iron. Its dose is from ℈ss to ʒj.

Cinnamon enters into the composition of *Acidum sulphuricum aromaticum*, *Infusum catechu compositum*, *Pulvis aromaticus*, *Spiritus ammoniæ aromaticus*, *Spiritus lavandulæ compositus*, *Syrupus rhei aromaticus*, *Tinctura cardamomi composita*, *Tinctura catechu*, and *Vinum opii* of the Pharmacopœia of the United States.

2. ANI'SUM.—AN'ISE.

Anise or *Aniseed* is the fruit of *Pimpinella Anisum*, Sex. Syst. Pentandria Digynia; Nat. Ord. Umbelliferæ; a native of the Levant and Egypt, but cultivated in many parts of Europe, and occasionally in the gardens of this country. Germany and Alicant export a large quantity of the aniseed used in commerce. The Spanish variety, commonly called *Alicant aniseed*, is smaller and of a paler grayish-yellow than the rest, and is the most esteemed. The shape of all the varieties is oblong-ovate. The odor is aromatic and familiar; taste, sweetish, warm, and grateful.

Its medical properties are dependent upon

O'LEUM ANI'SI, OIL OF AN'ISE, which is obtained from the seeds by distillation. Its odor is like that of the vegetable; taste pungent and bitter sweetish; color very pale yellow. It congeals at a temperature of 50° Fahrenheit; and is soluble, in all proportions, in alcohol; but spirit, whose specific gravity is 0·84, dissolves only 0·42 of its weight.

Oil of anise of the British shops is imported from Germany and the East Indies; and is used in considerable quantity, duty having been paid, in the year 1839, on 1544 lbs. (Pereira.) *Oleum Badiani*, *Oil of Star anise* (*Illicium anisatum*), which has the smell and taste of oil of anise, is said to be sometimes substituted for it. It is imported into this country from the East Indies.

Oleum anisi is an officinal preparation in the Pharmacopœia of the United States, and enters into the composition of *Syrupus Sarsaparillæ Compositus* and *Tinctura Opii Camphorata*.

Anise, like all the aromatics, is gratefully excitant, and carminative. It is rarely used, however, except in cases of flatulent colic in children, or as a corrigent to medicines which are apt to cause tormina. The dose of the powder is twenty or thirty grains or more; that of the volatile oil from ♏v to ♏xv, dropped on sugar, or rubbed up with it and water, or camphor water. The infusion—*aniseed* *tea*—is occasionally taken, sweetened, in cases of tormina; but it is not as effectual as the oil. *Aniseed water* may be made extemporaneously by diffusing the oil in water by the aid of sugar, or of carbonate of magnesia; and, in the latter case, filtering through paper.

3. CARUM.—CAR'AWAY.

Caraway is the fruit of *Carum Carui:* Sex. Syst. Pentandria Digynia; Nat. Ord. Umbelliferæ; a native of Europe, which grows in meadows and pastures, and is naturalized in England, and cultivated in the gardens of this country.

Caraway seeds are of an ovate oblong figure, and striated surface. Their odor is aromatic and peculiar; taste warm, spicy, and grateful. Their medical properties are wholly dependent upon

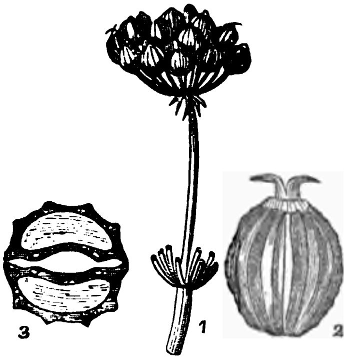
O'LEUM CARI, OIL OF CAR'AWAY, which is obtained from the seeds by distillation. Accordingly, the virtues are yielded, as in the case of anise, to alcohol, and—to a less degree—to water.

The medical virtues of Caraway are the same as those of anise. The dose of the dried fruit, powdered, is from a scruple to a drachm; that of the oil from one to ten drops. The latter is often added to cathartic pills and powders to correct their nauseating and griping tendency.

Caraway seeds are used in considerable quantity on the continent of Europe for seasoning bread, cheese, and other articles of food; and they are, sometimes, baked in cakes, to which,—in the opinion of perhaps most persons,—they communicate an agreeable flavor; and, at the same time, gently excite the digestive function to greater activity.

The oil forms part of *Spiritus Juniperi Compositus;* and the seeds, of *Tinctura Cardamomi composita* and of *Tinctura Sennæ et Jalapæ,* of the Pharmacopœia of the United States.

Fig. 112.



Coriandrum sativum.

1. A portion of an umbel in fruit. 2. A fruit magnified. 3. Transverse section of the same.

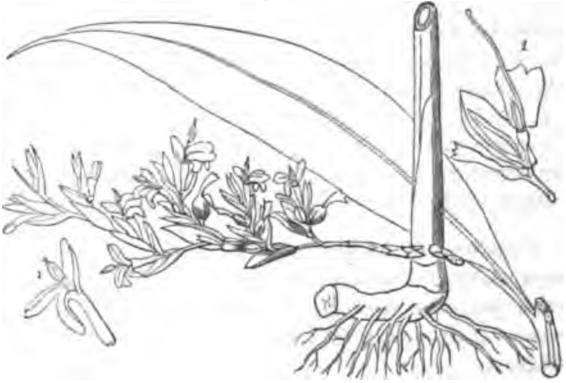
4. CORIAN'DRUM.—CORIAN'DER.

Coriander is the fruit of *Coriandrum sativum, officinal Coriander;* Sex. Syst. Pentandria Digynia; Nat. Ord. Umbelliferæ; which is said to be a native of Tartary, the Levant, and Southern Europe; but has become naturalized in many parts of Europe, and is cultivated for medicinal purposes. It flowers in June; and the fruit is ripe in August. The fruit is of about the shape and size of white pepper. It is finely ribbed, and may be divided into two seeds, which are adherent by their concave surfaces. The smell is aromatic, and characteristic; and is dependent upon a volatile oil, which is separable by distillation with water.

Coriander possesses all the virtues of the aromatics. It is scarcely ever given alone; but is employed as a corrigent to other remedies. It has been considered well adapted to correct the griping qualities of senna; and, accordingly, it enters into the composition of the infusion of senna; but its place might be taken by any of the other aromatics. It forms part of *Confectio Sennæ*, *Infusum Gentianæ Compositum*, *Infusum Sennæ*, *Tinctura Rhei et Sennæ*, and *Tinctura Sennæ et Jalapæ*, of the Pharmacopœia of the United States.

5. CARDAMO'MUM.—CAR'DAMOM.

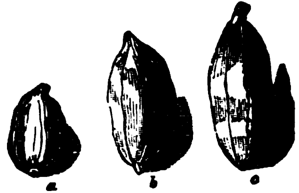
Fig. 113.



Elettaria Cardamomum.

CARDAMOM or *Cardamom seed* is the fruit of *Alpinia Cardamomum*, *Elettaria Cardamomum* of Maton, *true* or *officinal cardamom:* SEX. SYST. Monandria Monogynia; NAT. ORD. Scitamineæ,—a native of the mountainous part of the coast of Malabar. Formerly, there were three varieties, known by the names *lesser*, *middle*, and *greater cardamoms;—cardamomum minus*, *cardamomum medium*, and *cardamomum majus*—the fruit of congenerous plants, regarding which there was confusion both botanically and commercially. This confusion has been in part cleared away by modern pharmacologists: as, however, the lesser cardamom is the only variety recognized in the Pharmacopœia, it alone will receive attention here.

Fig. 114.



Cardamom.

a. Shorts. *b.* Short-longs. *c.* Long-longs.

The dried capsule of the cardamom, as we receive it, is of an ovate, oblong, obtusely triangular shape; from 3 to 10 lines long; rarely more than three broad, which contains many angular, blackish or brown seeds—the *cardamom* of the Pharmacopœia. These seeds are white internally, and have an agreeable aromatic odor, and an aromatic, warm, pleasant taste. Three varieties, according to Dr. Pereira, are met with in commerce, the *shorts*, *short-longs*, and *long-longs*, which are represented in the marginal figure. When subjected to analysis by Trommsdorff, they were found to contain an essential oil, 4·6; fixed oil, 10·4; a salt of potassa, combined with coloring matter, 2·5; fecula, 3·0; nitrogenous mucilage with phosphate of lime, 1·8; yellow coloring matter, 0·4; and woody fibre, 77·3. The virtues are dependent upon the volatile oil. The properties of cardamom do not differ from those of other spices. It is rarely given alone, but forms a useful—and is a favorite—adjuvant and corrigent to stomachic and cathartic medicines. It is an agreeable and grateful aromatic.

TINCTU'RA CARDAMO'MI, TINCTURE OF CAR'DAMOM.—(*Cardam.* cont. f℥iv; *Alcohol. dilut.* Oij. It may likewise be prepared by the process of displacement.) The dose of this is from fʒi to fʒiij. It may be added to tonic or cathartic infusions or mixtures.

TINCTU'RA CARDAMO'MI COMPOS'ITA, COMPOUND TINCTURE OF CAR'DAMOM.—(*Cardamom.* contus. ʒvj; *Cari* contus. ʒij; *Cinnam.* contus. ʒv; *Uvar. passar.* ℥v; *Cocci* contus. ʒj; *Alcohol. dilut.* Oiiss. Macerate for fourteen days; express, and filter.) It is somewhat singular that this ancient preparation, if introduced at all into the Pharmacopœia of the United States, should not have been so prior to the last edition of 1851; as it has always been kept in the shops, and is, perhaps, best known of all the aromatic tinctures. Its dose is fʒj to fʒiij, as an excitant and carminative; and it is often added to tonic and excitant mixtures, to render them less disagreeable.

Cardamom enters into the composition of *Extractum colocynthidis compositum*, *Pulvis aromaticus*, *Tinctura cinnamomi composita*, *Tinctura gentianæ composita*, *Tinctura rhei*, *Tinctura rhei et aloës*, *Tinctura sennæ et jalapæ*, and *Vinum aloës*, of the Pharmacopœia of the United States.

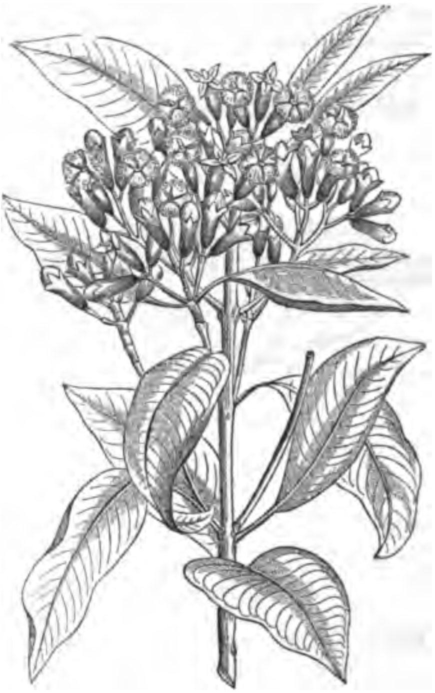
6. CARYOPHYL'LUS.—CLOVES.

Cloves are the unexpanded flowers of *Caryophyllus Aromaticus;* Sex. Syst. Icosandria Monogynia, Nat. Ord. Myrtaceæ; a native of the Moluccas; but extensively cultivated in Sumatra, Mauritius, Bourbon, Martinique, St. Vincents, &c. They are collected by the hand, or separated from the tree by beating it with reeds; are received on cloths placed under the tree, and dried by the fire, or in the sun. The quantity of this spice consumed in various ways is great. In the year 1839, according to Dr. Pereira, duty was paid in England on 93,549 lbs. The supply of the United States is derived chiefly from the West Indies, and the European colonies in Guiana. Those from the East Indies—the *Amboyna* and *Bencoolen Cloves*—are the best, being the largest, plumpest, and most oily. The Cayenne are the least valued.

Cloves resemble a small nail with a notched head—hence the name, from the French *clou*, Latin, *clavus*, 'a nail.' Their color is a deep brown; odor strong, aromatic, and peculiar; taste acrid and pungent. They were found by Trommsdorff to be composed, in the 100 parts, of volatile oil, 18; almost tasteless resin, 6; a peculiar kind of tannin, 4; gum, 13; woody fibre, 28; and water, 18. Unquestionably, their active properties are dependent upon the volatile oil —**O'LEUM CARYOPHYL'LI**,—which is in the materia medica list of the

Pharmacopœia of the United States, being obtained from cloves, on the large scale, in this country,—from seven to nine pounds of cloves yielding about one pound of oil. (Wood & Bache.) The oil of cloves, as procured by distillation and repeated cohobation, is of a reddish-brown color, and heavier than water.

Fig. 115.



Caryophyllus aromaticus.

The properties of cloves are similar to those of cinnamon and other aromatics,—and the essential oil is used in the same cases as the stronger essential oils. The dose of powdered cloves is from five to ten grains; of the oil, from ♏ij to ♏vi. Water does not extract all their virtues, so that *Infusum Caryophylli* of the pharmacopœias is not so strongly aromatic and excitant as the quantity of the spice employed might lead us to expect. All the properties are extracted by alcohol; yet the *tincture* is not officinal in the Pharmacopœias of Great Britain and Ireland, or of this country. It is contained, however, in the *Codex Medicamentarius* of Paris (*Caryophyll.* ℥j; *Alcohol. dilut.* ℥iv).

Oil of cloves, diluted with olive oil, has been used as an embrocation in hooping cough; but it possesses no virtues as a rubefacient over other essential oils of equal strength.

INFU'SUM CARYOPHYL'LI, INFU'SION OF CLOVES.—(*Caryophyll.* cont. ʒij; *Aquæ bullient.* Oj.) The dose of this, as an aromatic, is f℥iss to f℥iij.

Cloves enter into the composition of *Spiritus Ammoniæ aromaticus*, *Spiritus Lavandulæ compositus*, *Syrupus Rhei aromaticus*, and *Vinum opii* of the Pharmacopœia of the United States.

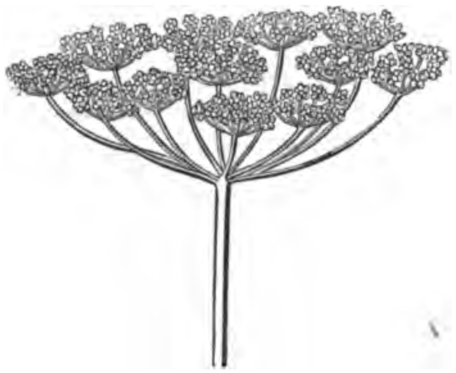
7. FŒNIC'ULUM.—FENNELSEED.

Fennelseed are the fruit of *Fœniculum vulgare;* Sex. Syst. Pentandria Monogynia; Nat. Ord. Umbelliferæ; a native of the south of Europe, Italy, Portugal, &c., but cultivated in the gardens of the United States. The whole plant possesses the odor of the seeds, which, alone, are officinal.

Fennelseed are of an ovate shape; fragrant odor, and warm, sweet, and, to most persons, agreeably aromatic taste. Their virtues are dependent upon an essential oil, which is separated by distillation—**O'LEUM FŒNIC'ULI.** The seeds contain about 2·5 per cent. Dr. Pereira states, on private information, that 19 cwt. yield 78 lbs. of oil. It congeals below 50° of Fahrenheit, and its s. g. is 0·997. That which is used in the shops of the United States is imported.

AQUA FŒNIC'ULI, FENNEL WATER, has been admitted into the last edition of the Pharmacopœia of the United States. It is rarely used except as a carminative in the bowel affections of infancy. It may be made by rubbing the oil with carbonate of magnesia; adding water, and filtering through paper, as in the case of cinnamon water. Boiling water, however, extracts the essential properties, and *Fennel tea* is a common preparation as a domestic carminative. The dose of the powdered seeds is from ℈j to ʒj; that of the oil from ♏ij to ♏xv.

Fig. 116.



Fœniculum vulgare.

Oil of fennel enters into the composition of *Spiritus juniperi compositus*, and fennelseed into that of *Syrupus sennæ* and *Tinctura Rhei et Sennæ.*

8. MENTHA PIPERI'TA.—PEP'PERMINT.

Peppermint, SEX. SYST. Didynamia Gymnospermia; NAT. ORD. Labiatæ; is indigenous in Great Britain, and is found in various parts of Europe, Asia, and Africa. It has also been introduced into this country; and, in some parts of it, is largely cultivated on account of its volatile oil. It is a perennial; but the cultivators have observed, that, in order to maintain its flavor in perfection, it is necessary to transplant the roots every three years. It is cut for medical use in August, about the period of the development of the flowers.

The odor of peppermint is strong, and, to most persons, agreeable; the taste is pungent and aromatic, and it produces a sensation of coldness in the mouth. Its virtues are essentially dependent upon volatile oil, which rises on distillation with water, along with an appreciable portion of camphor. Its constituents are like those of lavender. Like other aromatics, it communicates its virtues to hot water, but less completely than to alcohol.

Peppermint is much employed as an aromatic excitant and carminative,—in popular practice more perhaps than any of the others,—as well as to correct the operation of cathartic and other agents, or to mask the taste of nauseous medicines. It may be given in the form of infusion—*Peppermint tea*—which is a common domestic remedy, but is not officinal. The officinal preparations are the following.

O'LEUM MENTHÆ PIPERI'TÆ, OIL OF PEP'PERMINT, obtained by distilling the fresh herb with water, is prepared in considerable quantity in this country; the amount yielded by the plant varying according to the season,—a warm and dry season being the most favorable. The largest produce in Great Britain is said to be three drachms and a half of oil from two pounds of the fresh herb;—the smallest about a drachm and a half from the same quantity. (Brande.) It has a strong odor like that of the plant; an acrid, very hot, and biting taste, with a peculiar sensation of coldness; is of a greenish-yellow color; and of a specific gravity, according to some, from 0·907 to 0·920; according to others, 0·899.

As an excitant aromatic and carminative, it is taken in the dose of one to five drops, on sugar dissolved or not in water.

TINCTU'RA O'LEI MENTHÆ PIPERI'TÆ, TINCTURE OF OIL OF PEP'PERMINT.—(*Ol. menth. piperit.* f℥ij; *Alcohol* Oj.) This tincture—long known, and used, under the name of *Essence of Peppermint*—is prescribed in the same cases as the volatile oil. Dose, 10 to 20 drops on sugar.

AQUA MENTHÆ PIPERI'TÆ, PEP'PERMINT WATER.—This water may be distilled from the herb, fresh or dried; but in the United States Pharmacopœia, it is directed to be made, like *Aqua cinnamomi* (p. 474), by rubbing half a fluidrachm of the *oil* with half a drachm of *carbonate of magnesia*, adding gradually two pints of *distilled water;* and filtering.

Peppermint water possesses, to a certain degree, the properties of the plant. It is chiefly used as a vehicle for other remedies. Dose, f℥i to f℥iij.

TROCHIS'CI MENTHÆ PIPERI'TÆ, TROCHES OF PEP'PERMINT.—(*Ol. menth. piperit.* fʒi; *Sacchar.* pulv. ℔j; *Mucilag. tragacanth.* q. s., to be divided into troches weighing ten grains each.) Peppermint lozenges are used as a gentle carminative, but they are rarely prescribed by the physician.

9. MENTHA VIR'IDIS.—SPEARMINT.

Spearmint, occupying botanically the same place in the SEXUAL SYSTEM and the same NATURAL ORDER as the last, has similar medical virtues and composition; but it is not so agreeable, although by some considered more so. It is cultivated in the gardens of this country for its oil; and flowers in August.

O'LEUM MENTHÆ VIR'IDIS, OIL OF SPEARMINT.—TINCTU'RA O'LEI MENTHÆ VIR'IDIS, TINCTURE OF OIL OF SPEARMINT (*Essence of Spearmint*), and **AQUÆ MENTHÆ VIR'IDIS, SPEARMINT WATER,** are officinal in the Pharmacopœia of the United States.

10. MONAR'DA.—HORSEMINT.

Monarda Punctata; SEXUAL SYSTEM Diandria Monogynia; NAT. ORD. Labiatæ, is an indigenous plant, which grows on light gravelly or sandy soils, from New Jersey to Louisiana, and flowers from June to September. The whole herb is officinal in the Pharmacopœia of the United States. Its smell is aromatic; taste warm, pungent, and bitterish.

Like other mints, its properties are dependent upon volatile oil, which may be separated by distillation with water. An *infusion—horsemint tea*—is a domestic remedy as a carminative; but is rarely employed by the practitioner.

O'LEUM MONAR'DÆ, OIL OF HORSEMINT, distilled from the fresh herb, is of a reddish amber color, of an odor like that of the plant, and a warm, very pungent taste. It is a powerful rubefacient, when applied to the cutaneous surface,—exciting even vesication; hence, it has been used in low fevers, chronic pains, cholera infantum, and other diseases in which rubefacients are considered to be indicated. The dose, as an excitant, should it be desirable to administer it internally, is two to three drops on sugar.

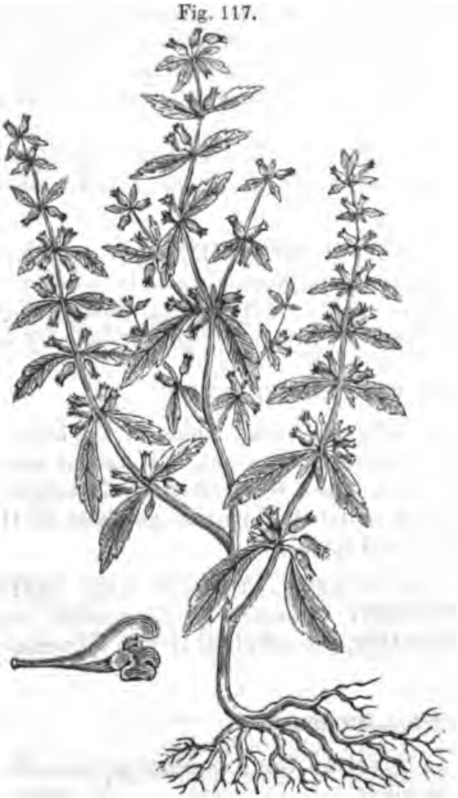
Monarda Coccinea has similar virtues.

11. HEDEO'MA.—PEN'NYROYAL.

Hedeoma Pulegioïdes or *Cunila Pulegioïdes;* SEX. SYST. Diandria Monogynia; NAT. ORD. Labiatæ, is indigenous in the United States, in all parts of which it is common in dry grounds and pastures,—its presence being very perceptible from the strong odor exhaled by it. It is not the same as the European pennyroyal, which is *Mentha Pulegium;* yet the virtues of the two are identical.

Hedeoma has an agreeable aromatic odor, and a warm pungent taste, resembling that of mint. Like mints, its medical properties are wholly dependent upon an essential oil, **O'LEUM HEDEO'MÆ,** which is separated by distillation with water. They are readily yielded to hot water; and *pennyroyal tea* is a common domestic remedy, supposed to favor the advent of the menses; but possessing no special virtues of an emmenagogue kind.

Fig. 117.



Hedeoma pulegioides.

Like aromatics in general, infusion of pennyroyal is given as a carminative in all cases in which a gently excitant agency on the stomach is needed. When taken hot, like all the aromatics, it promotes perspiration.

The oil, which has a light yellow color, and the smell and taste of the herb, and is of the specific gravity 0·948, is used in the same cases as the aromatic oils in general. The dose is from two to ten drops.

12. ORIG'ANUM.

Origanum vulgare, common Marjoram; Sex. Syst. Didynamia Gymnospermia; Nat. Ord. Labiatæ, is a native of America, Europe, and Asia. In the United States, from Pennsylvania to Virginia, it grows along the roadsides, and in dry stony fields; and is in flower from June to October. It is rarely, however, employed medicinally. Its medical properties, which are dependent upon an essential oil separable by distillation with water, are the same as those of the mints, and the aromatic herbs in general; but it is very rarely used.

O'LEUM ORIG'ANI, OIL OF ORIG'ANUM.—*Oil of Marjoram, Oil of Thyme*, recently and properly prepared, is of a yellowish color; but if too much heat be used in the distillation, it is said to be reddish, and to acquire the same hue by age. It has the smell of the plant, and a hot, very acrid, taste. Two hundred weight of the herb is said by Mr. Brande to yield, on the average, one pound of oil. It is scarcely ever given internally, being generally employed as an external irritant in the same cases as oleum monardæ. In carious odontalgia, a drop is introduced on cotton or lint into the hollow of the tooth.

The oil enters into the composition of *Linimentum Saponis Camphoratum* of the Pharmacopœia of the United States.

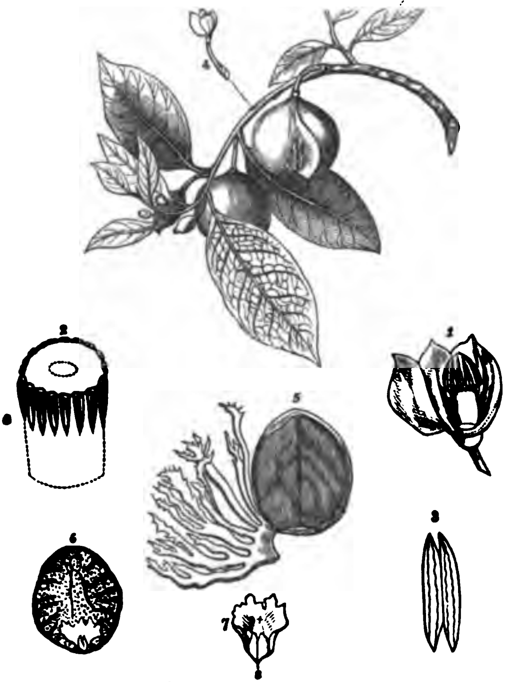
13. MYRIS'TICA.—NUTMEG.

Nutmeg is the kernel of the fruit of *Myristica Moschata;* Sex. Syst. Diœcia Monadelphia; Nat. Ord. Myristicaceæ; a native of the Moluccas. The fruit is round or oval, of the size of a small peach. The outer covering, which is at first thick and fleshy, and abounds in an austere astringent juice, afterwards becomes dry and coriaceous; and, separating into two valves form the apex, discloses a yellowish or red reticulated membrane or *arillus*, which is the *mace* of commerce—*Macis* in the secondary list of the Pharmacopœia of the United States—closely investing a thin brown shell, which contains the kernel or nutmeg.

The fruit is gathered by the hand, and the outside envelope is rejected. The *mace* is carefully separated, flattened, and dried in the sun. The nuts are dried in the sun or in ovens, and exposed to smoke, until the kernel rattles in the shell. They are then broken open, and the kernels having been removed, and steeped for a short time in a mixture of lime and water, to protect them from the depredations of insects, they are cleaned, and packed in chests for exportation. The nutmegs are very liable to the attacks of an insect called the *nutmeg insect.*

Nutmegs are imported into England from the Indian Archipelago, either directly, or indirectly by the Cape of Good Hope, or Holland. In 1838, according to Dr. Pereira, duty was paid on 114,093 lbs. Into this country, they are brought either directly from the East Indies, or indirectly through England and Holland. They are occasionally exported in small quantities from the West Indies, into which their culture has been introduced.

Fig. 118.



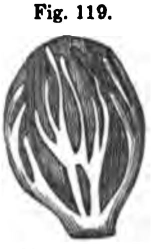
Myristica moschata.

1. Calyx and stamens. 2. Stamens. 3. Anthers. 4. Female flower. 5. Nut. 6. Seed, divided. 7. Embryo.

Nutmegs have a fragrant aromatic odor, and an agreeable pungent taste; are of a roundish or oval shape; streaked; of a grayish color; yielding readily to the knife or the rasp, but not easily pulverizable. On analysis by M. N. E. Henry, they were found to contain volatile oil; red fat, soluble in alcohol; yellow fat, insoluble in alcohol; alcoholic extractive; amidin, and ligneous fibre, with lime.

The volatile oil—O'LEUM MYRIS'TICÆ—procured by submitting nutmegs to distillation with water, is always imported from the East indies. It is colorless or pale yellow, and has the smell and taste of nutmeg. By agitation with water, it separates into two oils,—the one lighter, the other heavier than water.

Fig. 119.



Nutmeg in the shell surrounded by the mace.

Oleum Myristicæ of the former Pharmacopœia of the United States, and of the London Pharmacopœia, is the expressed oil, improperly called *oil of mace*, inasmuch as mace yields a volatile oil on distillation with water, similar to volatile oil of nutmeg.

The expressed oil is prepared by beating nutmegs to a paste, which is enclosed in a bag, exposed to the vapor of water, and expressed between heated plates. The nutmeg is said to yield 10 or 12 per cent. of this oil. The best is imported from India in stone jars. An inferior kind is in oblong cakes, covered with the leaves of some plant. It is composed, according to Dr. Pereira, of tallow-like oil, 7; yellow oil, 8½; volatile oil, ⅜. An artificial preparation is said to be sometimes substituted for the genuine oil. It is made by mixing together various fatty matters, as suet, palm oil, spermaceti, wax, lard, &c., adding some yellowish or brownish coloring substance, and giving flavor to the mixture by the volatile oil of nutmeg. This expressed oil is never used internally; and rarely as a gentle local excitant; therefore, it was properly left out in the last editions of the Pharmacopœia of the United States.

Nutmeg possesses the virtues of all the aromatic excitants, of which it is one of the most agreeable; and therefore most used. It is a well-known spice to give flavor to alimentary substances; and is used therapeutically for the same purpose, as well as to mask the flavor of other less agreeable agents. It is said to have proved narcotic in India, when administered in large doses; but, practically, no such effects are ever witnessed from it here. Dr. Pereira asserts, that he is acquainted with a case in which the narcotic effects of a whole nutmeg were several times experienced.

Either nutmeg or mace, whose medical properties are analogous, may be given in the dose of from ℈j to ʒss, in powder obtained by grating: or oleum myristicæ may be employed in the dose of ♏j to ♏x.

SPIR'ITUS MYRIS'TICÆ, SPIRIT OF NUTMEG.—(*Myristic.* contus. ℥ij; *Alcohol. dilut.* cong.; *Aquæ* Oj. Distil a gallon.) It possesses the virtues of nutmeg; but is chiefly used as an agreeable adjunct to other agents. Dose, fʒj to fʒiij.

Nutmeg enters into the composition of *Acetum Opii*, *Pulvis aromaticus*, *Spiritus Lavandulæ compositus*, *Syrupus Rhei aromaticus*, *Trochisci Cretæ*, and *Trochisci Magnesiæ* of the Pharmacopœia of the United States.

14. SAS'SAFRAS RADI'CIS CORTEX.—BARK OF SAS'SAFRAS ROOT.

Laurus Sassafras, SEX. SYST. Enneandria Monogynia; NAT. ORD. Lauraceæ (Lindley), is an indigenous tree, common throughout the United States, which blooms in the Middle States in the beginning of May. The wood is used in Europe, whither it is sent in billets; but it is not much employed in this country,—the bark of the root being the officinal portion, which is given as an excitant.

The bark, as found in the shops, is generally in small irregular pieces, invested, at times, with a brownish epidermis; of a reddish color; very brittle, and presenting, when freshly broken, a lighter color than that of the exposed surfaces. Its odor is fragrant, and has been compared to that of fennel; taste aromatic and sweetish. The virtues are dependent upon a volatile oil, which is separable by distillation with water. They are yielded readily to water; so that the infusion is occasionally employed as an excitant. *Sassafras tea* has, indeed, been used in some parts of the country in place of tea. Flavored with milk and sugar, it is sold at daybreak in the streets of London under the name of *Saloop*.

The medical properties of sassafras are those of the Lauraceæ in general. It is rarely, however, used as an excitant. It is employed mainly as an adjunct to diet drinks for syphilis and syphiloid affections; but, in this respect, has by no means the reputation it enjoyed formerly.

O'LEUM SAS'SAFRAS, OIL OF SAS'SAFRAS.—The oil, obtained by distillation with water, is one of the heaviest of the volatile oils; s. g. 1·094. The bark yields from 1·25 to 2 per cent. It is of a yellow color, turning reddish by age, and has the odor of the sassafras, and a warm, pungent, aromatic taste. By agitation with water, it separates into two oils; one lighter, the other heavier, than water.

Sassafras oil possesses the virtues of all the aromatic oils; but it is rarely given. Dose, ♏j to ♏x.

The bark of sassafras root enters into the composition of *Decoctum Sarsaparillæ compositum* and *Extractum Sarsaparillæ Fluidum* of the Pharmacopœia of the United States; and sassafras oil into that of *Syrupus Sarsaparillæ compositus.*

15. LAVAN'DULA.—LAV'ENDER.

Lavandula vera, *Common* or *Garden Lavender;* SEX. SYST. Didynamia Gymnospermia; NAT. ORD. Labiatæ, is a native of Southern Europe; but is largely cultivated in Great Britain, and also in the gardens of this country, where it flowers in August. All the plant possesses the same properties; but the flowers or spikes are alone officinal, which should be cut when they begin to bloom.

Lavender flowers are of a bluish-gray color; and have a fragrant, agreeable odor, and a warm bitterish taste. When subjected to analysis, they afford volatile oil, resin [?], tannic acid, a bitter principle, and woody fibre; but the oil is the active constituent. It is obtained by distilling the flowers with water.

The medical virtues are those of an excitant like other aromatics, but as its taste is not as agreeable as many of them, it is rarely prescribed alone. It is more frequently used as an adjunct to other remedies administered in cases of nervous debility; or to articles whose disagreeable odor it is desirable to conceal or mask.

O'LEUM LAVAN'DULÆ, OIL OF LAV'ENDER, is of a lemon color, has a fragrant odor—that of the flower; and a warm taste. Its specific gravity varies from 0·877 to 0·905,—the lightest oil being the purest. The oil obtained from the whole herb has a specific gravity 0·9206; but the odor of the oil is considerably deteriorated when the stalks and leaves are used in distillation. One pound of oil is yielded by from fifty to seventy pounds of the flowers. Like other essential oils, it is soluble in alcohol of a certain specific gravity. That of 0·830 dissolves it in all proportions; that of 0·887 dissolves only 42 per cent.

The oil is chiefly used as a perfume; but occasionally it is employed as a carminative, especially in nervous headache, hysteria, &c., in the dose of from one to five drops on sugar.

SPIR'ITUS LAVAN'DULÆ, SPIRIT OF LAV'ENDER.—(*Lavandul.* recent. ℔ij; *Alcohol.* cong.; *Aquæ* Oij; distil a gallon.) This preparation is rarely employed alone. It is chiefly used for the formation of other officinal compounds. It is often made by adding oil of lavender to rectified spirit.

SPIR'ITUS LAVAN'DULÆ COMPOS'ITUS, COMPOUND SPIRIT OF LAV'ENDER, *Compound Tincture of Lavender, Lavender drops, Red lavender drops.*—(*Sp. lavandul.* Oiij; *Sp. rosmarin.* Oj; *Cinnamom.* cont. ℥j; *Caryophyll.* cont. ʒij; *Myristic.* cont. ℥ss; *Santal.* rasur. ʒiij.) This is one of the most common remedies prescribed by the practitioner. It is employed also by the unprofessional in nervous and hysterical affections, and in cases of faintness or depression. It is likewise added, occasionally, to other excitants and to tonic mixtures. The dose is from fʒj to fʒij dropped on sugar.

Lavender water—as it is termed in the shops—is a solution of oil of lavender, and other scents, in spirit. It is chiefly used as a perfume.

16. ROSMARI'NUS.—ROSE'MARY.

Rosmarinus officinalis or *common rosemary*—Sex. Syst. Diandria Monogynia; Nat. Ord. Labiatæ—an evergreen shrub, grows spontaneously in Southern Europe, and Asia Minor, and is cultivated in the gardens of Great Britain and this country. The tops or flowering summits are the officinal portion. Their odor is fragrant and grateful; taste, aromatic and bitterish.

The medical virtues of rosemary, which are dependent upon essential oil, are communicated partially to water, wholly to alcohol. They are those of the labiate plants in general,—as the mints, many of which have been supposed to be possessed of emmenagogue properties; but probably only through the excitant influence of the essential oil. It is rarely given internally; and when it is so, is usually as an adjunct. Dose of the powder, gr. x to ʒss.

O'LEUM ROSMARI'NI, OIL OF ROSEMARY, is procured from rosemary by distillation with water. The fresh leaves afford the oil in considerable quantity; yet great discrepancy exists as to the precise amount; some, as Baumé, cited by Wood and Bache, stating it at 26 per cent., others, as Mr. Brande, holding, that one pound of the fresh herb yields about a drachm of the oil. The former estimate is evidently an exaggeration. Oil of rosemary is transparent and colorless, having a very fragrant odor, and taste like that of the plant. Its specific gravity is about 0·85. When long kept, it deposits a substance identical with camphor. It is rarely prescribed internally, although calculated to act as well as *Oleum lavandulæ* as a nervine. It is generally associated with other substances as a topical excitant; and hence forms part of various rubefacient liniments.

If administered internally, it may be in the same dose as the other aromatic volatile oils,—three to ten drops.

SPIR'ITUS ROSMARI'NI, SPIRIT OF ROSEMARY.—(*Ol. Rosmarin.* ʒij; *Alcohol.* cong.; *Aquæ* Oj; distil a gallon.) It is rarely employed internally, but is added to lotions and liniments, as *Linimentum Saponis;* and to one compound excitant tincture, *Spiritus Lavandulæ compositus.*

Queen of Hungary's water is formed extemporaneously by a mixture of spirit of lavender and spirit of rosemary (*Sp. Lavand.* f℥xii; *Sp. Rosmarin.* f℥iv). It is chiefly used as a perfume; and, also, as an excitant in the same cases as *compound spirit of lavender*,—for example, in nervous depression, fainting, &c. It makes, likewise, a good excitant liniment.

Oil of rosemary enters into the composition of *Linimentum Saponis camphoratum*, and *Tinctura Saponis camphorata* of the Pharmacopœia of the United States.

17. GAULTHE'RIA.—PARTRIDGE BERRY.

Gaultheria procumbens, SEX. SYST. Decandria Monogynia; NAT. ORD. Ericaceæ, is indigenous from Canada to Georgia, growing in mountainous tracts, in large beds, and in dry, barren, and sandy plains, beneath the shade of shrubs and trees, and especially of other evergreens. It has various names in different parts of the United States, such as *deerberry*, *teaberry*, *wintergreen*, *mountain tea*, *berried tea*, *grouseberry*, &c.; certain of the names being owing to the circumstance, that the fruit is a favorite article of food with partridges, deer, and grouse. It flowers from May to September.

The leaves, which are the officinal part of the plant, owe their virtues to an essential oil,—**O'LEUM GAULTHE'RIÆ**—separable by distillation with water. They contain, also, tannic acid, which gives them marked astringency. The oil has a brownish-yellow color, a sweetish, pungent, peculiar taste; and an agreeable and peculiar odor. It is heavier than any of the essential oils, its specific gravity being 1·17.

The medical properties of gaultheria, are those of the aromatics in general. It possesses at the same time slight astringency, which may adapt it to certain cases of diarrhœa; but it is chiefly used, on account of its agreeable flavor, as an adjunct to other medicines.

Hot water extracts its virtues; and, therefore, it may be used in the form of infusion or tea. The oil is, however, most commonly employed.

It is an ingredient of *Syrupus Sarsaparillæ compositus* of the Pharmacopœia of the United States.

18. JUNIP'ERUS.—JU'NIPER.

Juniper or *juniper berries* is the fruit of *Juniperus communis;* SEX. SYST. Diœcia Monadelphia; NAT. ORD. Coniferæ—a native of the North of Europe, but introduced into this country, in some parts of which it has become naturalized. In the Pharmacopœias of Europe, not only the berries, but the tops and wood are officinal; but as the berries possess all the virtues, they alone are received into the Pharmacopœia of the United States. They are round, of about the size of a pea, and more or less shrivelled; of a blackish-purple color, and covered with a glaucous bloom. The taste is sweetish, with a terebinthinate flavor. The property on which their virtues are dependent is volatile oil, separable by distillation with water; and they are communicated to water and to alcohol. They are, consequently, excitant; yet neither they, nor any of the preparations, are much exhibited as excitants.

They are chiefly prescribed as diuretics, under which class some of the preparations are mentioned. The essential oil is the only one that needs comment here.

O′LEUM JUNIP′ERI, OIL OF JUNIPER.—The oil, used in this country, is chiefly obtained from Europe. Its odor is similar to that of turpentine; taste acrid, hot, and like that of juniper; color light greenish-yellow; s. g. 0·911. It is said to be adulterated occasionally with oil of turpentine, which renders it of considerably less specific gravity. The dose of the oil, as an excitant, is from five to fifteen drops.

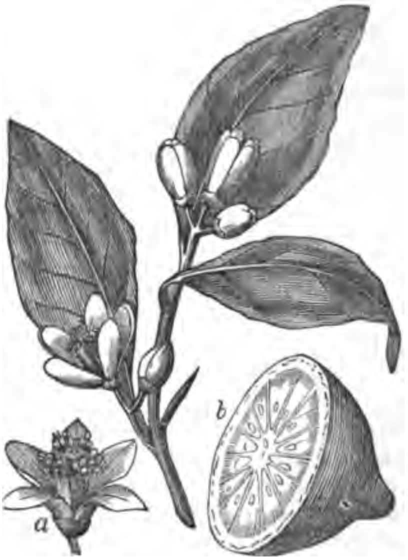
Juniper berries enter into the composition of *Spiritus Juniperi compositus*, of the Pharmacopœia of the United States.

19. LIMO′NIS CORTEX.—LEMON PEEL.

The outer rind of the fruit *Citrus Limonum*, *Lemon tree;* Sex. Syst. Polyadelphia Icosandria; Nat. Ord. Aurantiaceæ, is officinal in most of the pharmacopœias. The lemon tree has been considered a native of Asia. It is now, however, naturalized throughout the whole of the South of Europe, in Northern Africa, Asia Minor, and in many of the more temperate regions of the tropics. It is largely cultivated in Spain, Portugal, Italy, Sicily, and Southern France; and we occasionally observe it, fostered and protected in our own gardens. The lemons that are used in England are imported chiefly from Spain, Portugal, Italy, and the Azores; those used in this country come mainly from the West Indies and the Mediterranean.

Lemon peel has a fragrant well-known odor, and a warm, aromatic bitter taste. By drying, it loses a good deal of its warmth and odor. It yields by expression or distillation an essential oil, **O′LEUM LIMO′NIS**, which is obtained on the large scale, but not by the apothecary, and is, therefore placed in the Materia Medica list of the Pharmacopœia of the United States.

Fig. 120.



Citrus limonum.

a. Flower. *b.* Fruit, divided.

The virtues of lemon peel are yielded to water and to alcohol.

Lemon peel is indebted to its essential oil for its excitant virtues. It forms an agreeable adjunct to excitant or tonic infusions, but is rarely given alone. It enters into the composition of *Spiritus Ammoniæ aromaticus* of the Pharmacopœia of the United States.

O'LEUM LIMO'NIS, OIL OF LEMONS.—This, as remarked above, is obtained either by expression or distillation. In the former process, the rind is grated from the fruit, and then expressed in hair sacks. The oil is suffered to remain at rest until it deposits some of its impurities, after which it is decanted and filtered. Thus obtained, it is turbid, and, owing to its containing mucilaginous matter, does not keep so well as that obtained by distillation; but its flavor is said to be more pleasant and sweet. It possesses, in a high degree, the flavor of the fruit. It is of a pale yellow color, and is said to be sometimes adulterated with fixed oil, and with alcohol. The former adulteration can be detected, as in the case of volatile oils in general, by its leaving a stain on paper, when dropped on it and evaporated by a gentle heat: the latter is known by agitation with water producing milkiness. It has the same excitant properties as other volatile oils; and, like them, may be given as a carminative dropped on sugar, or rubbed up with it. It is generally, however, used as a perfume to cover the objectionable odor of other substances. Its employment in certain cases of conjunctivitis has been referred to in an early part of this volume.

Oil of lemons is a constituent of *Unguentum Veratri albi* of the Pharmacopœia of the United States.

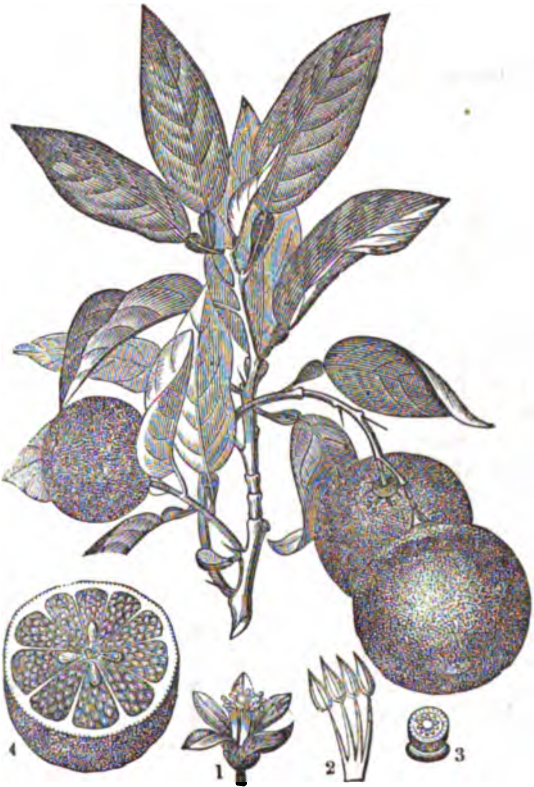
20. O'LEUM BERGA'MII, OIL OF BERGAMOT'—the volatile oil of the rind of the fruit of *Citrus Limetta*, *Citrus Limetta Bergamium*, *Citrus Bergamia*, *Bergamot Citrus*, which is cultivated in the South of Europe—is in the Materia Medica list of the Pharmacopœia of the United States. It is imported from the South of Europe. It is only used as a scent to cover nauseous substances; and, with this view, it is made to form part of *Unguentum Sulphuris compositum* of the Pharmacopœia of the United States.

21. AURAN'TII CORTEX.—ORANGE PEEL.

Orange peel is the outer rind of the fruit of *Citrus vulgaris*, *Bigarade* or *Bitter Orange Tree;* and of *Citrus Aurantium*, *Common* or *Sweet Orange Tree;* SEX. SYST. Polyadelphia Icosandria; NAT. ORD. Aurantiaceæ. The orange is a native of Asia. It grows wild in various parts of Northern Africa and Eastern Asia, and is cultivated in the warmer parts of the globe almost everywhere. In the southern portions of the United States, it is extensively cultivated, but the fruit is chiefly brought from the West Indies, the Western Isles, and the South of Europe.

Various parts of the orange tree, besides the peel of the fruit, are used in medicine. The leaves have a slightly bitter taste, and are aromatic and tonic. They contain a volatile oil, which is obtained by distillation, and constitutes the *Essence de Petit Grain*, of the French *Pharmaciens*. The flowers have an agreeable odor, dependent upon an essential oil, which has been termed *Neroli Oil*,—550 pounds of the flowers yielding about an ounce. It is used altogether in perfumery. The distilled water of the flowers, called *Orange-*

Fig. 121.



Citrus aurantium.

1. Flower. 2. A set of Stamens. 3. Section of Ovary. 4. Section of fruit.

flower Water, is much prescribed by the French as a nervine. The immature oranges, which fall off, are aromatic and bitter, and are used for flavoring curaçoa; hence they are called *Curaçoa Oranges.* When smoothed by a lathe, they form the best *issue peas* of the shops. The rind of the fruit, like that of the lemon, yields a volatile oil, which resembles, in odor, the rind itself. It is directed to be separated by distillation by many of the colleges.

Orange peel possesses similar properties to lemon peel, and is applicable to the same cases. It is an aromatic excitant, and is prescribed as an adjunct to tonic and excitant infusions, chiefly with the view of communicating flavor to them. The bark of the *bitter* or *Seville orange* is to be preferred where it is advised as a tonic adjunct or adjuvant. It is never, perhaps, given in substance.

CONFEC'TIO AURAN'TII, CONFEC'TION OF ORANGE PEEL.—(*Aurant. cort.* recent. [separated by grating] ℔j; *Sacchar.* ℔iij.) This confection is not much used. It possesses the aromatic virtues of orange peel, and may be employed as a vehicle for bitter powders, or for some of the preparations of iron, as the subcarbonate.

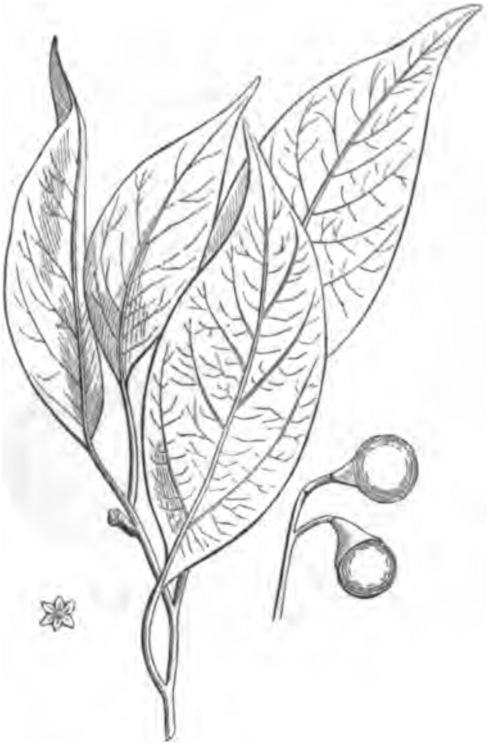
SYR'UPUS AURAN'TII COR'TICIS, SYRUP OF ORANGE PEEL.—(*Aurant. cort.* contus. ℥ij; *Aquæ bullient.* Oj; *Sacchar.* ℔iiss.) This syrup is chiefly employed to give an agreeable flavor to excitant and tonic infusions; fʒiij of it may be added to f℥vi of any of them. It enters into the composition of *Confectio aromatica* of the Pharmacopœia of the United States.

Orange peel enters into the composition of *Infusum Gentianæ*

Compositum, *Tinctura Cinchonæ Composita*, and *Tinctura Gentianæ Composita* of the Pharmacopœia of the United States.

22. CAM'PHORA.—CAMPHOR.

Fig. 122.



Camphora officinarum.

Camphor is a peculiar concrete substance, derived from *Laurus Camphora*, *Camphora officinarum*, and is purified by sublimation. It is not properly an essential oil, and yet it agrees in many of its properties with it. It differs, however, in its solidity at ordinary temperatures, and in its not being converted into resin by the oxygen of the air, or by nitric acid.

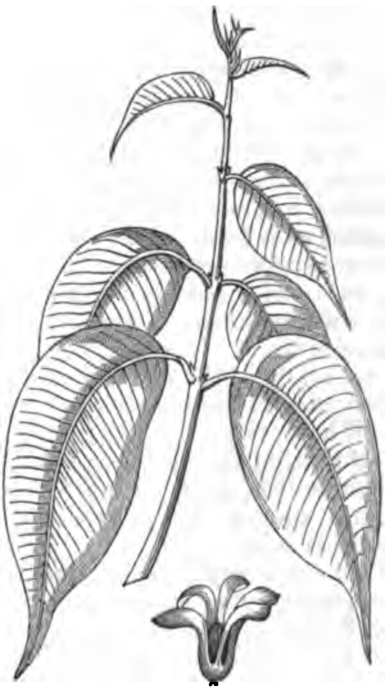
Laurus Camphora—Sex. Syst. Enneandria Monogynia, Nat. Ord. Lauraceæ—is a native of China, Japan, and Cochin China, and is said to have been introduced from Japan into Java. In China—it is affirmed—the chopped branches are steeped in water, and afterwards boiled, until the camphor begins to adhere to the stick used in stirring. The liquid is then strained, and on standing the camphor concretes: alternate layers of finely-powdered earth, and of this crude camphor, are then placed in a copper basin, to which another, inverted, is luted. Heat is now applied and the camphor sublimes. In Japan, the process is somewhat different: the roots and wood are chopped up, and boiled with water in an iron vessel, to which an earthen head containing straw is adapted. On the application of heat, the camphor sublimes and condenses on the straw.

Two kinds of crude camphor occur in commerce,—one called *tub camphor*, from being imported in tubs. It comes from Batavia, but is said to be the produce of Japan; it is, also, called *Dutch camphor*, and *Japan camphor*. The other kind—*common crude camphor*, *China camphor*, *Formosa camphor*, is imported from India in square chests. It is chiefly produced in the island of Formosa. This crude camphor is in small grains, or granular masses, of a dirty white color, but is never found in the shops. It is refined by sublimation. Formerly, all the refined camphor was obtained from abroad; but now the process is effected on a large scale in this country, and the camphor is considered equal to any that was formerly imported. The crude camphor is mixed with a small proportion of quicklime, and exposed in a glass or earthenware vessel, in a sand-bath, to a gradually increased heat, by which it is melted, and ultimately converted into vapor, which is condensed in a suitable vessel. (Wood & Bache.)

Camphor is also obtained in oriental climes from *Dryabalanops Camphora*, an inhabitant of Borneo and Sumatra, belonging to SEX. SYST. Polyandria Monogynia, NATURAL FAMILY, Guttiferæ. As this Borneo camphor, although much prized in the East, is unknown in the commerce of this country and of Europe, it requires no further notiee.

Refined camphor of the shops has the form of the vessel in which the sublimation has been accomplished, and is, therefore, generally in large hemispherical cakes, convex on one side, concave on the other, and perforated in the centre. It is of a white color; semi-pellucid; brittle, yet easily pulverizable, and of a crystalline texture. Its odor is strong, peculiar, and fragrant; taste bitterish and aromatic, accompanied by a sensation of coldness. It evaporates in the air at ordinary temperatures; and in closed vessels,—as in the bottles in the shop of the apothecary, which are exposed to light,—crystallizes on the sides. It is soluble to a slight extent only in water; but is soluble in alcohol; ether; the oils, both fixed and volatile, &c. If water be added to the solution in alcohol, the camphor is immediately precipitated. Its specific gravity is 0·9857.

Fig. 123.



Dryabalanops camphora.

There are few articles of the Materia Medica, regarding the effects of which on the animal economy there has been greater diversity of sentiment. In respect, however, to its excitant action in certain doses, there is but little disagreement; and it is this action only, that has to be considered here. When applied endermically, it excites pain; and if held in the mouth occasions heat, redness, and other signs of hyperæmia in the mucous membrane. When swallowed in substance, the sensations experienced in the epigastric region are similar to those induced by the essential oils in general. It is asserted by some, that depression has preceded the excitement, induced by it; but although the author has administered it in numerous cases with the view of carefully observing its effects, he has never witnessed this. In regard to its deleterious effects on the nervous system when taken in large doses, and the discordant views in relation thereto, opportunity may be afforded to treat in another place.

It may be remarked here, that whilst strangury has been ascribed to it by some, it is the main remedy on which many others depend in cases of strangury,—in that especially which is caused by cantharides. The author has neither observed the influence of camphor in the one case nor in the other. He is not disposed to place much value upon it as an excitant in those cases in which it has been so much extolled by many. It is chiefly in adynamic and long-protracted fevers that it has been prescribed; but almost always associated with some other agent, as with opium, where the object has been to allay restlessness and irritation; and, at the same time, to induce—as it has been conceived—some tendency towards the skin; or with carbonate of ammonia, where the prostration has been more considerable. In none of these cases, perhaps, does the practitioner look solely to the excitant influence of the camphor; but rather to that narcotic influence which has been ascribed to it by some.

Whatever properties it has appeared to possess as a diaphoretic —the belief in which has led to its use in other diseases, as chronic rheumatism, gout, &c.—have been probably owing to its gently-excitant agency; but reference has been made to this subject under another head.

Of old, camphor was esteemed to be possessed of antaphrodisiac properties; and many of the moderns have ascribed to it the same. M. Esquirol is stated to have cured by it hysteric nymphomania; and M. F. Le Gros affirms, that he found it the most active remedy he could use for blennorrhagic erections and chordee. As an antaphrodisiac the author has had no experience with it.

Miraculous virtues have been ascribed to it by M. Raspail—a fanciful therapeutist—who, for years has been in the habit of smoking and inhaling it under the form of cigar, both day and night. He placed under his bolster a certain quantity of purified camphor; in consequence of which, he says, his nights, instead of being agitated, were passed in calm and uninterrupted sleep. Whenever he awakes he chews from three to four grains at least; which he afterwards swallows with a little water. In the course of the night, the quantity sometimes amounts to as much as 12 grains. In the daytime, he takes a similar dose; and employs frictions with camphorated spirit on rising and going to bed, or whenever he experiences the least lassitude of spirit or the slightest exhaustion of body. "Under this treatment," he says, "I have—so to speak—shed the old skin of disease. I have grown young again in physical and moral strength. I am more disposed to labor, and am less inconvenienced than ever by it." M. Raspail's *cigarettes* have been much used, but it need hardly be said with no such advantages as he has experienced.

Camphor forms part of many of the officinal and other liniments of different pharmacopœias and formularies, as well as those of domestic use. In such cases, it is usually combined with other excitants.

The medium dose of camphor, in substance, is generally stated at from five to ten grains; which may be given rubbed up with sugar, —or—what is preferable—in the form of pill. An objection has been urged against the pilular form—that as, in this state, the camphor is with difficulty dissolved in the gastric fluids, it may float on the top, and be apt to excite nausea, or pain or uneasiness at the upper orifice of the stomach. (Wood and Bache.) The author has never witnessed any of these results, which probably occurred, in the cases where they have been met with, in consequence of the dose having been large. At the same time, with the opinion, which he possesses of the value of camphor as an excitant, he is disposed to place as much reliance on an ordinary dose of *Aquæ Camphoræ* of the pharmacopœia, which contains a very small amount of camphor, as on a larger dose administered in pill or powder.

As an antaphrodisiac it has been given in the dose of a drachm.

AQUA CAM'PHORÆ, CAMPHOR WATER.—(*Camphor.* ʒij; *Alcohol.* ♏xl; *Magnesiæ carbonat.* ʒj; *Aquæ destillat.* Oij.) The alcohol is added to break down the cohesion of the camphor; and the carbonate of magnesia facilitates its solution. Each fluidounce of the water is computed to contain three grains of camphor. The usual dose is from f℥ss to f℥j, and more.

TINCTU'RA CAM'PHORÆ, TINCTURE OF CAMPHOR.—(*Camphor.* ℥v; *Alcohol.* Oij.) This is the "*camphorated spirit of wine,*" of the older pharmacopœias. It is rarely given internally. If desirable, however, from 10 to 60 drops may be rubbed up with sugar, and water be added to make a draught, Should it be added without this precaution, the greater part of the camphor would be separated. Water must, consequently, be regarded as incompatible with it in prescriptions.

Tincture of camphor is generally employed as an excitant liniment in sprains and bruises; in cases of deep-seated pains, of a rheumatic or neuralgic kind, in which it is desirable to excite revulsion on the surface; and to modify the nutritive actions of a part, as in cases of tumors.

LINIMEN'TUM CAM'PHORÆ, CAMPHOR LIN'IMENT.—(*Camphor.* ℥ss; *Olei olivæ* f℥ij.)

LINIMEN'TUM SAPO'NIS CAMPHORA'TUM, CAMPH'ORATED SOAP LIN'IMENT, OPODEL'DOC.—(*Sapon. vulgar.* ℥iij; *Camphor.* ʒj; *Ol. rosmarin.*, *Ol. origan.* āā fʒj; *Alcohol.* Oj.)

TINCTU'RA SAPO'NIS CAMPHORA'TA, CAMPH'ORATED TINCTURE OF SOAP, *Soap Liniment.*—(*Sapon.* rasur. ℥iv; *Camphor.* ℥ij; *Ol. rosmarin.* f℥ss; *Alcohol.* Oij.)

These various liniments are employed under the same circumstances as Tinctura camphoræ. They are better adapted, however, for prolonged friction, by reason of the admixture of soap, or oil, or both; and, consequently, are generally prescribed where the object is to discuss tumors; or to occasion the taking up of any solid or fluid deposition.

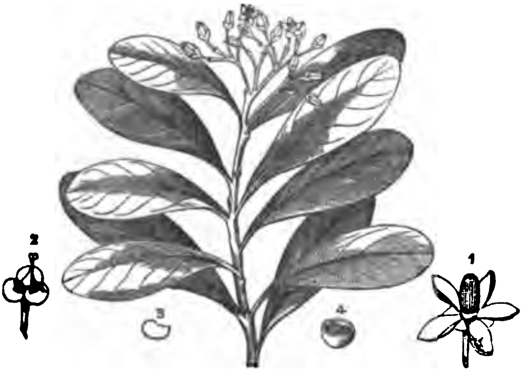
Camphor forms part of *Ceratum Plumbi Subacetatis* and *Tinctura Opii Camphorata* of the Pharmacopœia of the United States.

23. CANEL′LA.

Canella is the bark of *Canella alba*, *Laurel-leaved Canella*, *Wild Cinnamon;* Sex. Syst. Dodecandria Monogynia; Nat. Ord. Meliaceæ,—Guttiferæ (Jussieu); a tree, from ten to fifty feet high, which is indigenous in the West India Islands, and the neighboring continent of America.

Canella of the shops is the inner bark of the stem and branches, occurring in quills, but sometimes in flat pieces of considerable size. It is of a pale orange-yellow color, and of an odor and taste intermediate between cloves and cinnamon. It is confounded at times with *Winter's Bark*, and hence has been called *spurious Winter's Bark.* It certainly resembles it in taste, but not much in appearance. When subjected to analysis, canella yields volatile oil, which is its active ingredient; a little bitter extractive, which communicates to it what tonic property it possesses; and other matters of less importance. Alcohol extracts all its virtues.

Fig. 124.



Canella alba.

1. Petals and stamens. 2. Style. 3. Seed. 4. Berry.

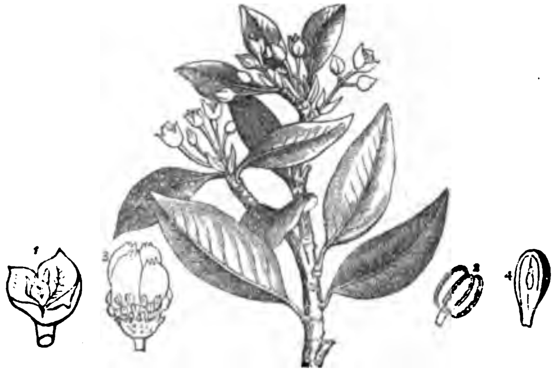
Canella possesses the ordinary excitant virtues of aromatic barks, and may be prescribed in the dose of gr. x to ʒss. It is rarely, however, given alone; but is added to cathartic and tonic agents, to act as a corrigent to the former, and an adjuvant to the latter. It enters into the composition of *Pulvis Aloës et Canellæ*, and *Vinum Rhei* of the Pharmacopœia of the United States.

24. WIN′TERA.—WINTER'S BARK.

This article is in the secondary list of the Pharmacopœia of the United States. It is the bark of *Wintera Aromatica*, *Drymis Winteri*, *Winter's Bark Tree;* Sex. Syst. Polyandria Tetragynia; Nat. Ord. Magnoliaceæ; an evergreen tree, which is indigenous along the Straits of Magellan, Chili, Peru, and New Granada.

The bark of the shops is in quills or rolled pieces; of a pale yellowish or dull reddish-gray color externally, with red elliptical spots. Internally, it is of a reddish-brown color; whilst the inner surface of canella, with which it has been confounded, is of a pale color. Like canella, its main constituent is volatile oil; but, unlike it, it contains tannic acid and oxide of iron. Its medical virtues are essentially those of canella, than which it is much less used. Dose of the powder, gr. x to ʒss.

Fig. 125.



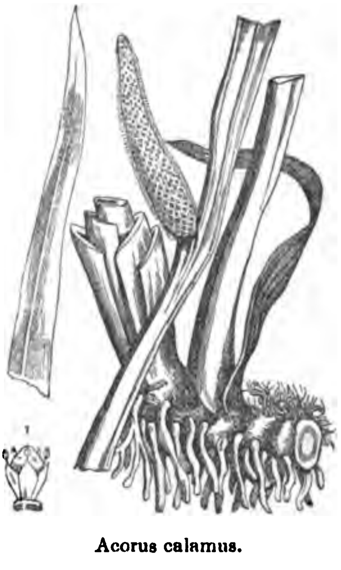
Drymis Winteri.

1. Sepals. 2. Anther. 3. Carpels. 4. A section of a carpel.

25. CAL'AMUS.—SWEET FLAG.

Calamus of the Pharmacopœia of the United States is the rhizoma of *Acorus Calamus;* Sex. Syst. Hexandria Monogynia; Nat. Ord. Aroideæ,—Acoraceæ (Lindley)—an indigenous plant, which grows abundantly in this country, in low, damp places, and along the sides of ditches and streams; and flowers in May and June. It also grows abundantly in many parts of Europe and Asia.

Fig. 126.



Acorus calamus.

The roots, as they are met with in the shops, are of various lengths, flattened, and of the breadth of the finger; they are of a yellowish-brown color, and on the under surface, there are numerous dark points, whence the roots arise: the texture of the rhizoma is spongy or corky, and the fracture short and rough. The odor is strong and rather fragrant; the taste aromatic, warm, and bitterish. On distillation with water, it yields an essential oil—*oleum calami aromatici* of the shops—on which its medical virtues essentially depend; but it is never used in medicine. It is said to be employed by the wholesale dealers in perfumery, and to be bought by snuff-makers, with the view probably of scenting snuff. In addition to the essential oil, calamus has been found also to contain resin and extractive, the latter of which has an acrid and sweetish taste.

Calamus is not much used in medicine: it appears, however, to have risen in estimation with the framers of the Pharmacopœia of the United States, who, in the edition of 1842, elevated it from the secondary to the primary list.

Its virtues being mainly dependent upon essential oil, are yielded to water; in the form of *infusion* (*Calam.* ℥j; *Aq. bullient.* Oj: dose, a wine-glassful), it may be given as a stomachic and carminative in atonic conditions of the digestive organs,—but it does not seem to have any virtues, not equally possessed by the other articles of the class. Dr. Pereira considers it to be especially serviceable in gouty subjects. The dose of the powder is from ℈j to ʒj.

It need scarcely be repeated, that a decoction is objectionable in every case where the medical properties are dependent wholly, or in part, on essential oil.

26. PIMEN'TA.—PIMEN'TO.

Pimento, *Allspice* or *Jamaica Pepper*, is the unripe berry of *Myrtus Pimenta* or *Eugenia Pimenta;* SEX. SYST. Icosandria Monogynia; NAT. ORD. Myrtaceæ—a native of the West Indies, and particularly abundant in Jamaica, whence one of its names. It is a native likewise of Mexico and South America. When the fruit has attained its full size, but is yet green, it is gathered and dried. The quantity on which duty was paid in England, in 1839, was, according to Dr. Pereira, 277,185 lbs.

The taste of allspice, which is a familiar spice, is pungent, slightly astringent, and mixed—like the odor, which is aromatic and resembles a mixture of cinnamon, nutmeg, and cloves. It imparts its flavor to water, and all its virtues to alcohol. The analysis of the berries by M. Bonastre furnished a variety of constituents, but those on which the medical properties are dependent are,—a volatile oil, separable into two oils, one lighter and the other heavier than water; and a green oil or resinous matter, which has an acrid, burning taste, and contributes to the activity of the pimento. Except in odor, the properties of the volatile oil appear to be almost identical with those of oil of cloves.

Pimento possesses the medical properties of other spices. It is a warm aromatic excitant;—not often administered alone; but chiefly used as an adjunct to other medicines, to communicate flavor, or to correct griping or nauseous properties. It is in extensive use as a condiment. The dose of the powder is from 10 to 40 grains.

O'LEUM PIMEN'TÆ, OIL OF PIMEN'TO, is obtained by submitting allspice, bruised, to distillation with water. Allspice, according to Dr. Pereira, yields about 1·37 per cent. of oil—heavy and light together. Its color is reddish-brown; odor very fragrant, and both that and the taste are those of the pimento, but to an increased degree. Its specific gravity is greater than that of water, averaging 1·021. It is employed medicinally in the same cases as the other aromatics and volatile oils. Dose from ♏ij to ♏x.

Aqua Pimentæ may be formed with the oil in the same manner as *Aqua Cinnamomi.*

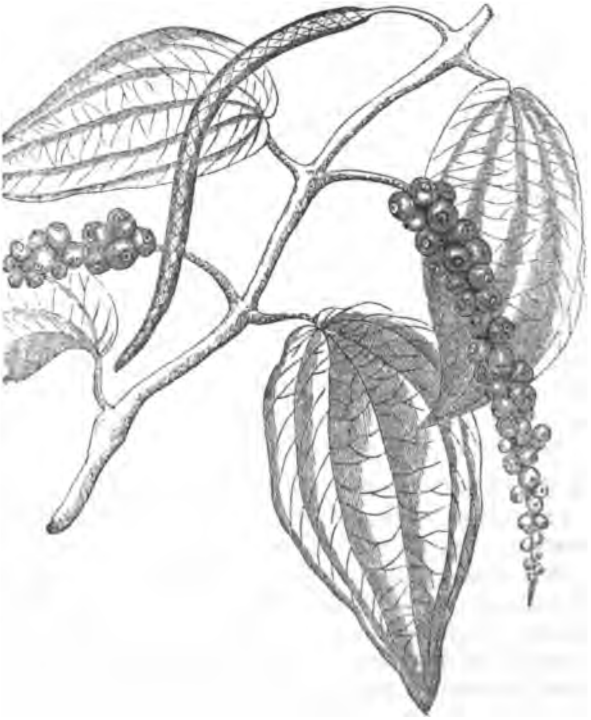
SPIR'ITUS PIMEN'TÆ, SPIRIT OF PIMEN'TO.—(*Piment.* cont. ℥ij; *Alcohol. dilut.* cong.; *Aquæ* Oj; distil a gallon.) It has the same medical qualities as the ordinary aromatic spirits. Dose, f j to fʒiij.

27. PIPER.—BLACK PEPPER.

The berries of black pepper—*Piper nigrum*—Sex. Syst. Diandria Trigynia; Nat. Ord. Piperaceæ (Kunth)—are the only officinal pepper in the Pharmacopœia of the United States. They possess, however, all the virtues of the class. The plant is cultivated in various parts of India and the Islands; and likewise in the West Indies; but Europe and America derive their main supplies from Sumatra and Java. In 1840, the quantity which paid duty on importation into England was, according to Dr. Pereira, 2,271,174 lbs.

The berries are gathered before they are perfectly ripe. On being dried, they become black and wrinkled; but this applies only to the outer surface; which, when removed, leaves the *white pepper*—*piper album*—which is a more delicate spice, not containing the same proportion of active ingredient.

Fig. 127.



Piper nigrum.

Pepper-corns are of the size of small peas; have an aromatic odor, and a fiery, pungent taste, which is dependent upon essential oil.

Accordingly, their virtues are yielded to alcohol, and—in a less degree—to water. On analysis, they have been found to yield, 1. Resin of Pepper, a very acrid substance, possessing in a great degree the acrid properties of the peppers; soluble in alcohol and ether, but not in volatile oils. 2. Volatile Oil of Pepper, having the odor and taste of pepper. 3. Piperin, found in all the peppers, and described under the head of Tonics.

The medical properties of pepper are essentially those of capsicum, than which it is less acrid. Like it, it is extensively used as a condiment. In atonic conditions of the stomach, as in the gouty, it is occasionally given to check nausea, or to remove flatulence; but it is not often prescribed—partly, perhaps, owing to familiarity with it, as a condiment constantly on the table, having prevented it from receiving as much attention as it otherwise might have done. It has been prescribed occasionally, in place of cubebs, in gonorrhœa, and the other mucous inflammations for which the latter remedy has been advised.

A watery *infusion* has been found serviceable in relaxed sore throat; and it has occasionally been prescribed as an excitant in paralysis of the tongue. Formed into an *ointment*, it has been used in tinea capitis, and with this view an Unguentum Piperis Nigri (*Adipis* ℔j; *Piper. nigr.* pulv. ℥iv), was officinal in the Dublin Pharmacopœia; but it has to be employed with caution, and is scarcely ever used on this side of the Atlantic.

The dose of black pepper is from gr. v to gr. xv. It may be administered either in berry or powder. In the latter case it may be made into pills.

A nostrum, called *Ward's Paste*, acquired much celebrity in piles, fistulæ, and chronic affections of the rectum; and, in consequence, a substitute was introduced into the British Colleges under the name Confectio Piperis Nigri. It has received high testimony in its favor; and would seem to have been beneficial in diseases of the lower part of the bowels, in which an excitant is indicated. Sir Benjamin Brodie asserts, that it has sometimes proved successful in severe cases of piles, by mixing with the fæces, and coming in contact with the diseased parts. It consists of black pepper, elecampane root, fennel seed, honey, and sugar.

EXTRAC'TUM PIP'ERIS FLU'IDUM, FLUID EXTRACT OF BLACK PEPPER.—This newly-introduced process in the Pharmacopœia of the United States (1851), consists in exhausting *black pepper* by means of *ether*, evaporating the ether, and separating the crystals of piperin which form. The extract contains most of the volatile oil and acrid resin of the pepper, with little of the piperin. It may well take the place of the *oil of black pepper*, which has long been in use, and is a residue of the process for preparing piperin. The dose of the fluid extract is one or two minims, given in emulsion, or, combined with other substances, in pill.

28. CAP'SICUM.—CAYEN'NE PEPPER.

Cayenne Pepper is the fruit of *Capsicum annuum;* Sex. Syst. Pentandria Monogynia; Nat. Ord. Solaneæ;—Solanaceæ (Lindley),—a native of the warmer regions of Asia and America, and extensively cultivated in Europe and this country. The fresh fruit, called *Chillies*, is sold for pickling; and the dried fruit of the druggists bears the same name.

There are different varieties of capsicum, which produce a fruit varying in shape; but the oblong varieties are those that are chiefly used medicinally. The fruit, when perfectly ripe, dried, and reduced to powder, forms *red pepper* or *Cayenne pepper*.

The odor of capsicum is aromatic and pungent; the taste very biting, hot, and aromatic. Its virtues, which have been considered to be dependent upon a peculiar principle called *capsicin*, are yielded to ether, alcohol, and water. The following is the analysis of M. Braconnot:—Acrid oil (*capsicin*), 1·9; wax, with red coloring matter, 0·9; brownish starchy matter, 9·0; peculiar gum, 6·0; animalized matter, 5·9; woody fibre, 67·8; salts (citrate of potassa, 6·0; phosphate of potassa, and chloride of potassium, 3·4);—9·4. Total, 100.

Its action, when taken internally, is excitant; and when applied to any portion of the cutaneous surface, rubefacient, and, consequently, revellent. In an overdose, it may cause inflammation of the stomach; but it is not easy to conceive, that a sufficient quantity to produce this effect could be readily taken, in consequence of its acrid action on the mouth. It is a well-known condiment; and, in the East Indies, is used in very large quantities, without any disagreeable results. A friend of the author has seen a gentleman, who had resided for a long time in Hindostan, eat it upon bread and butter—the layer of the pepper being as thick as that of the butter. In those climes, the effect of the elevated temperature has an obtunding influence on the function of innervation; digestion is accordingly imperfectly performed, and excitant condiments are indulged in.

Capsicum is not often administered as a general excitant; but it is highly appropriate wherever there is defective impressibility of the stomach. In cases of malignant cholera, and in the low stages of fever, it is occasionally prescribed by some; but it is more frequently employed in asthenic dyspepsia,—as in that which occurs in atonic gout, or in the habitual drunkard. It has, also, been prescribed in paralytic and lethargic cases; but internal excitants must be used in such cases with caution,—for fear, that the pathological condition, which is usually hemorrhage of the encephalon, or vascular hyperæmia, should be augmented by it. It has likewise been advised as an adjunct to sulphate of quinia in intermittents, in which there is great want of gastric impressibility. It is most commonly, however, used as a local excitant, especially in cases of malignant or sluggish sore throat; and its good effects in scarlatina maligna have been deposed to by many excellent observers. The author has occasionally seen asthenic or sluggish sore throat aggravated by it; but, at other times, benefit has resulted. In cynanche maligna—including in the term the cynanche of scarlatina maligna—it is given, by some, internally at the same time. The following form is one that is often used as a gargle. (*Capsic.* pulv. ʒj; *Sodii chlorid.* ℈j; *Aceti* f℥ss; *Aquæ ferventis* f℥vj. Infunde et cola.) In relaxed conditions of the throat or uvula, it may be applied also in the form of tincture by means of a camel's hair pencil.

As a rubefacient, capsicum is used wherever cutaneous revellents are considered to be indicated,—as in the delirium or coma of fever; but in such cases sinapisms are generally preferred. It may be made into a cataplasm in the same manner as mustard, and be applied to the lower extremities; or it may be mixed with heated spirit and used as a lotion. In similar cases, as well as when the circulation does not go on actively in the lower limbs, as shown by cold feet, woollen socks may be dusted with the powder. In neuralgic pains, the same applications are often beneficial; and in the cold stage of cholera, where frictions are indicated, cayenne pepper is often added to the ointments used for this purpose. It is a common adjunct to the Unguentum Hydrargyri in such cases.

The capsicum cataplasm is not so apt to vesicate as the sinapism.

The dose of capsicum powder is from three grains to ten, which may be made into pills with crumb of bread; or—especially in cases of atony of the stomach—with extract of gentian. (*Capsic.* pulv., *Ext. gentian.*, āā ℈j; *Aquæ* q. s.; ut fiant pilulæ xij. Each pill contains nearly two grains of capsicum.)

In cases of cynanche, the gargle, before recommended, may be used, or the simple infusion of capsicum, or a mixture of the tincture of capsicum and water,—(*Tincturæ capsici* f℥ss; *Aquæ* f℥viij.)

INFU'SUM CAP'SICI, INFUSION OF CAYENNE PEPPER.—(*Capsic.* ℥ss; *Aq. bullient.* Oj. Macerate for two hours and strain.) This preparation has been introduced into the Pharmacopœia of the United States (1851), although it is generally prepared at home. It is commonly used as a gargle, but might be given internally as a stimulant in the dose of fʒij to f℥ss.

TINCTU'RA CAP'SICI, TINCTURE OF CAYENNE PEPPER.—(*Capsic.* ℥j; *Alcohol. dilut.* Oij.) The dose of the tincture of cayenne pepper is from ♏x to fʒj or more, in the cases before mentioned. It is likewise employed occasionally to cover the taste of oil of turpentine, as well as to prevent the nausea which the oil might induce; and is sometimes used as a rubefacient, when evaporated to the consistence of an extract, and spread over the part.

29. CUBEB'A.—CUBEBS.

Cubebs are the berries of *Piper Cubeba;* SEX. SYST. Diandria Trigynia; NAT. ORD. Piperaceæ. This species of pepper is a native of Java and Prince of Wales Island; but flourishes, also, in India and Guinea. It is the dried unripe fruit. It resembles black pepper, except that it is lighter colored, and each pepper-corn is furnished with a short stalk, which has given it the name *Piper caudatum.* Within the hard shell is a spherical seed, which is whitish internally, and oily. The odor of cubebs is aromatic; the taste pungent like pepper; and camphoraceous.

The active ingredient of cubebs is the volatile oil,—**OLEUM CUBEBÆ**—which is separated by distillation, is officinal in the Pharmacopœia of the United States; and is regarded by some as the best and most convenient preparation of cubebs. (Pereira.) The analysis of cubebs by Monheim afforded the following results;—green volatile oil, 2·5; yellow volatile oil, 1·0; *cubebin*, probably the same as piperin, 4·5; balsamic resin, 1·5; wax, 3·0; chloride of sodium, 1·0; extractive, 6·0; lignin, 65·0; loss, 15·5. Total, 100·00.

The action of cubebs on the economy is, in many respects, like that of copaiba. It has also the general excitant properties of the peppers; but it is rarely administered except in diseases of the genito-urinary mucous membrane, on which its action is like that of copaiba, probably through the operation of its essential oil, which is separated from it, passes into the mass of the blood, and is discharged along with the urine by the kidney. Like copaiba too, in overdoses, it is apt to induce urticaria, and to excite inflammation of the gastro-enteric mucous membrane. In gonorrhœa, it is given under the same circumstances as copaiba; and, like that agent, it may be injurious in violent inflammatory cases, and in the early stages of ordinary cases. There are numerous instances on record, in which unpleasant accidents—as orchitis, and cystitis—have resulted from its improper administration. Many practitioners, however, give it in every stage of the disease. In gleet, and chronic inflammation in general of the mucous membrane of the urinary organs, its employment is more appropriate. It has been advised, also, in the gonorrhœa of the female, as well as in leucorrhœa; but here its efficacy is more limited; some, indeed, deny it to have any. In nocturnal incontinence of urine it has been extolled, given in tolerably large doses, twice a day for several weeks; and it has been found useful in nocturnal emissions.

It is affirmed, that in abscess of the prostate, benefit has resulted from the gentle stimulus it has afforded; and in hemorrhoids, its agency has been likewise found beneficial. In most respects, indeed, its action resembles that of copaiba. In one respect, there would appear to be a difference between them. Copaiba is said to have induced chronic rheumatism, whereas, cubeba has been administered in that disease, and, it is said, advantageously.

Cubeba is commonly prescribed in gonorrhœa in powder, and in doses of one, two, and even four drachms, repeated once or oftener in the day. In affections of the bladder and prostate, the dose is generally less,—from ten to thirty grains. Electuaries, lozenges, dragées and boluses, have been prepared with it; but there seems to be no great advantage in these formulæ.

In consequence of the gastric irritation sometimes produced by it, it has been proposed, that, like copaiba, it should be given in enema, to the amount of one or two drachms or more of the powder, suspended in five or six ounces of an oleaginous mixture.

It is advisable to keep the bowels open during its use; for when hardened fæces are permitted to accumulate, the spice, according to Dr. Paris, insinuates itself into the mass, and occasions excoriations of the rectum.

TINCTU'RA CUBEB'Æ, TINCTURE OF CUBEBS.—(*Cubeb.* contus. ℥iv; *Alcohol. dilut.* Oij. It may also be made by the process of displacement.) The dose of this tincture is one or two fluidrachms. It is occasionally, though rarely, used as a carminative; but it is not unfrequently employed in gonorrhœa.

The volatile oil—**O'LEUM CUBEB'Æ**—is likewise much used by many practitioners in the same disease. Its dose is ten or twelve drops, suspended in water by means of mucilage, or dropped on sugar.

On the continent of Europe, an *oleo-resinous extract of cubebs*,—prepared by adding the oil to the resinous extract of cubebs, which is made by digesting the cake left after the distillation of the oil in alcohol, and distilling off the spirit—is occasionally prescribed in gonorrhœa; as well as an *ethereal hydro-alcoholic extract of cubebs;* but they do not seem to be preferable to the preparations already indicated.

In the last edition of the Pharmacopœia of the United States (1851), an oleo-resin is introduced under the name of

EXTRACT'UM CUBEB'Æ FLU'IDUM, FLUID EXTRACT OF CUBEBS.—This is prepared by pouring *ether* on a pound of *cubebs* in powder, in a percolator, until two pints have passed; distilling, by means of a water-bath, a pint and a half of the ether, and exposing the residue in a shallow vessel, until the whole of the ether has evaporated. It possesses all the activity of the drug, containing the volatile oil and resin; and may be given in the dose of five to thirty minims, suspended in water.

30. SINA'PIS.—MUSTARD.

Mustard is a well-known acrid stimulant, taken as a condiment to facilitate the digestion of other substances, but is rarely employed internally as a therapeutical agent. It is chiefly used in the form of cataplasm as a revellent; and frequently, as an excitant, to the wrists, ankles, or epigastrium, where the powers of the system are much prostrated, as in adynamic fevers, and other diseases of a similar character. In these it is greatly preferable to blisters; as the latter abstract from the system a quantity of serum, which can scarcely fail to antagonize the good effects that might follow from the excitation. Occasionally, too, mustard is added to pediluvia, to render them more excitant. The mode of formation and application of the cataplasm is given elsewhere. (See REVELLENTS.)

When it is desired to exhibit mustard internally as an excitant, *mustard whey* may be given, which is prepared by boiling half an ounce of the bruised seeds or powder in a pint of milk, and straining. The dose is f℥iv, two or three times a day.

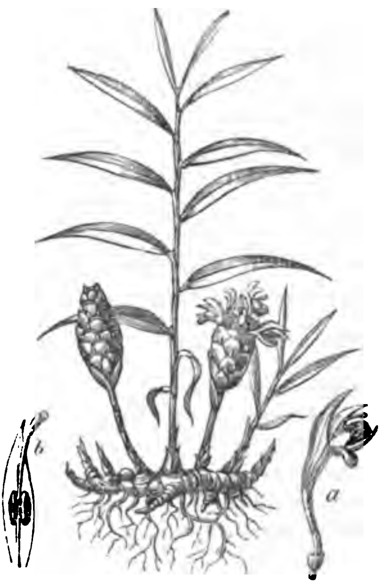
The volatile oil—OLEUM SINAPIS—has been occasionally used as a local excitant; but more frequently as a rubefacient and vesicant.

31. ZIN'GIBER.—GINGER.

The rhizoma of *Zingiber officinale, Amomum Zingiber, Narrow-leaved Ginger;* SEX. SYST. Monandria Monogynia; NAT. ORD. Zingiberaceæ (Lindley), is official in the various pharmacopœias of Great

Britain and of this country. Its native soil is doubtful, but it is supposed to be Asia: it is now cultivated in most tropical regions throughout the globe. The young shoots put forth in the spring are used in the preparation of the well-known preserve—*Preserved Ginger.* At the end of the year, or beginning of the next, when the herb has withered, and before the root becomes too woody, the rhizoma is in the fittest state for yielding the ginger of the shops; which is prepared by picking and cleaning them, and then either scalding them in boiling water, and drying them with artificial heat, or by peeling and drying them in the sunshine without immersion in hot water. In the former mode *Black Ginger* is said to be obtained; in the latter *White Ginger.* Dr. Pereira, however, thinks that this mode of preparation is insufficient to account for the difference between black and white ginger; and he is disposed to suspect the existence of some difference in the plants themselves. When imported into England, the common kinds are bleached by washing them in a solution of chlorinated lime; and, sometimes, by exposing them to the fumes of burning sulphur,—processes which, as remarked by Dr. Pereira, cannot fail to injure the aromatic.

Fig. 128.



Zingiber officinale.

a. Flower. b. Stamen.

Black ginger is imported into this country almost exclusively from Calcutta, and is called by the druggists *East India Ginger.* White ginger is imported from England, where it is said to undergo some preparation. It is generally termed *Jamaica Ginger*, and is the most prized. (Wood and Bache.) In England, the quantity of ginger on which duty was paid, in the year 1840, was, according to Dr. Pereira, 9063 cwt.; of which 7528 cwt. were imported from the British West Indies; and 1535 from the East Indies.

As found in the shops, black ginger has a wrinkled epidermis, and is of a dirty grayish-brown color externally. The outer portion is horny; the centre of a whitish color, and somewhat farinaceous. White ginger is destitute of the epidermis; of a pale, grayish-yellow color, and of a more farinaceous texture.

When subjected to analysis, ginger affords, as main constituents, a volatile oil, and a soft resin. Its starch, of fine quality, and perfectly white, to the amount of more than 25 per cent., has been separated by the ordinary process of procuring arrow-root.

Ginger is one of the most prized of the aromatics, and as such is used as a condiment. It is rarely given alone, except in domestic practice, when it is often taken in the form of *ginger tea* in tormina, and in gastric and intestinal flatulency. Therapeutically, it is more frequently prescribed than any other aromatic as a corrigent to substances which are apt to excite nausea, gastrodynia, or tormina. It is occasionally used as a collutory and gargle in relaxation of the uvula, and in relaxed sore throat; and, at times, is applied as an excitant and rubefacient to the skin; but it is inferior to mustard, and is, therefore, rarely applied.

The dose of the powder, as an excitant, is from gr. x to gr. xx or more. The *infusion—ginger tea—*may be made of from ʒij to ʒiv, of ginger to Oss of boiling water; sweetened, and taken in doses of one or two table-spoonfuls.

INFU'SUM ZINGIB'ERIS, INFU'SION OF GINGER, introduced into the last edition of the Pharmacopœia of the United States (1851), is made by infusing *ginger*, bruised, ℥ss, in *boiling water* Oj. The dose is f℥ij.

TINCTU'RA ZINGIB'ERIS, TINCTURE OF GINGER.—(*Zingib.* contus. ℥viij; *Alcohol.* Oij,—prepared by maceration or by displacement.) Tincture of ginger is an excellent carminative. It is rarely, however, given alone; but is a good adjunct to tonic and cathartic mixtures. It is chiefly used in the preparation of

SYR'UPUS ZINGIB'ERIS, SYRUP OF GINGER.—(*Tinct. Zingib.* f℥iv; *Syrup.* cong.) A syrup may also be made extemporaneously by mixing *tincture of ginger* with *simple syrup.* It is added to tonic and cathartic mixtures to prevent flatulence, and give flavor. It is much used, likewise, as an addition to the common soda water as drunk at the fountain.

Ginger enters into the composition of *Acidum Sulphuricum Aromaticum*, *Pilulæ Scillæ Compositæ*, *Pulvis Aromaticus*, *Tinctura Cinnamomi Composita*, and *Vinum Aloës* of the Pharmacopœia of the United States.

82. ARMORA'CIA.—HORSE'RADISH.

Horseradish, whose general properties have been described elsewhere (p. 286)—is a well-known excitant condiment, when fresh; and is adapted, therefore, to act as an internal, as well as an external excitant; it is likewise, to a certain extent, diuretic; but it is rarely employed in medicine; and Dr. Christison has remarked that "on the whole, it might be expunged from the pharmacopœias with little inconvenience."

The dose, as an excitant, when scraped into shreds, is ʒss or more. The Pharmacopœia of the United States has an

INFU'SUM ARMORA'CIÆ, INFU'SION OF HORSE'RADISH.—(*Armorac.* incis., *Sinapis* contus. āā ℥j; *Aq. bullient.* Oj.) The infusion is rarely prescribed. It has been advised in chronic rheumatism, paralysis, and dropsies of an asthenic kind. The dose is f℥ss to f℥ij, two or three times a day.

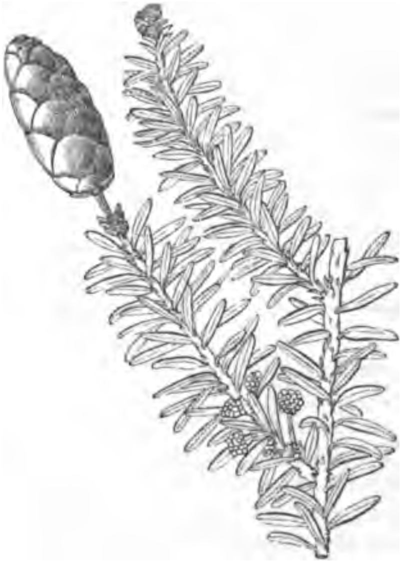
38. TEREBIN'THINA.—TUR'PENTINE.

The term turpentine is usually given to vegetable juices, liquid or concrete, which consist of resin, and a peculiar volatile oil, separable by distillation, called *Oil of Turpentine.*

The only turpentines, that are officinal in the Pharmacopœia of the United States, are **TEREBIN'THINA, TUR'PENTINE,** the juice of the *Pinus Palustris, Long-leaved Pine, Yellow Pine, Pitch Pine, Swamp Pine,* and other species of Pinus; SEX. SYST. Monœcia Monadelphia; NAT. ORD. Coniferæ; and **TEREBIN'THINA CANADEN'SIS**: *Canada Turpentine, Canada Balsam, Balsam of Fir,* the juice of *Abies Balsamea, Canadian Balsam Fir, Balm of Gilead Fir, American Silver Fir.*

1. **TEREBIN'THINA,** of the Pharmacopœia of the United States, *American* or *White Turpentine*—the juice of *Pinus Palustris* chiefly—is not identical with the common European turpentine, which is the produce of *Pinus Sylvestris, Wild Pine,* or *Scotch Fir.* It is chiefly obtained from Virginia and North Carolina, and is procured as follows. In the winter months, holes are made in the trunk of the tree, three or four inches from the ground, which are capable of holding two or three pints, or more, into which, in the spring, the juice begins to flow, and continues through the summer and autumn. The juice is removed from these holes as they fill, and is transferred into casks, in which it acquires the consistence of a soft solid. The quantity of raw turpentine, used by the turpentine distillers of Wilmington, N. C. alone, is astonishing. It is stated in the North Carolina Chronicle, published in that town, that there are three establishments, which work up about 200 barrels a day, making between 62,000 and 63,000 barrels per annum. 75,000 or 80,000 barrels, it was expected, would be used in the year 1843. Besides, nearly 100,000 barrels were shipped from Wilmington in the year ending the first of July, 1842.

Fig. 129.



Abies balsamea.

Turpentine procured as above, has the odor that is characteristic of all the terebinthinates; a warm, pungent, bitterish taste, and a white color tinged with yellow. Its consistence varies with the temperature.

2. **TEREBIN'THINA CANADEN'SIS,** *Canada Turpentine*—the juice of *Abies Balsamea*—is collected in Canada and the State of Maine. Between

the bark and the wood of the trunks and branches are vesicles, which contain the turpentine. This exudes when they are broken, and is received into a bottle. When fresh, it is of the consistence of thin honey; but, by time and exposure, it becomes more and more solid. It is yellow, transparent, very tenacious, possessing the terebinthinate odor in an agreeable form, and having the taste of those substances. In this country, it is usually brought to market in bottles, but is exported to England in casks. In 1838, the quantity imported into England was, according to Dr. Pereira, 7259 pounds. Both these turpentines yield 17 or 18 per cent. of volatile oil on distillation.

Besides these, which are officinal in this country, there are others —as 1. *Common European Turpentine*—TEREBINTH'INA VULGA'RIS—which, as already remarked, is procured from *Pinus Sylvestris;* 2. *Larch*, or *Venice Turpentine*—TEREBINTH'INA VEN'ETA—obtained from *Larix Europœa, Common Larch;* 3. *Chian* or *Cyprus Turpentine*—TEREBINTH'INA CHIA SEU CYP'RIA—obtained from *Pistacia Terebinthus, Turpentine Pistachia:* SEX. SYST. Diœcia Pentandria; NAT. ORD. Terebinthaceæ; 4. BORDEAUX' TUR'PENTINE, from *Pinus Pinaster*, or *P. Maritima, Pinaster*, or *Cluster Pine;* 5. *Strasburg Turpentine*, TEREBINTH'INA ARGENTORATEN'SIS, from *Abies Picea, Silver Fir* of Europe; 6. *Common Frankincense*—ABIE'TIS RESI'NA, *Thus*, from *Abies Communis;* 7. DAMAR'RA TUR'PENTINE, from *Pinus Damarra*, which grows in the East India Islands; and 8. DOMBEY'A TURPENTINE, the produce of *Dombeya Excelsa*, a native of Chili.

All the terebinthinate oleo-resins resemble each other in smell and taste. They soften and become liquid by heat; readily take fire, and burn with a white flame, giving off much smoke, which, in a confined space, occasions a copious deposition of lampblack. They yield, by distillation, a large quantity of volatile oil, leaving a residuum consisting of *resin*. They are readily soluble in alcohol and ether; and unite with the fixed oils. Water extracts only a small portion of the volatile oil, but becomes largely impregnated with its flavor.

Terebinthinate preparations owe their medical properties to their volatile oil, which, like other volatile oils, is excitant,—occasioning, when swallowed, a sense of heat in the stomach; and, in large doses, nausea, and augmentation of the peristaltic action of the bowels. The essential oil is absorbed into the bloodvessels, operating on the system as an excitant, and passing to the kidneys, partly changed and partly unchanged, where it is separated along with the urine,—in small quantities increasing the secretion from those organs, and in larger, giving rise, at times, to nephritic symptoms, hæmaturia, and strangury. It is also exhaled from other secerning surfaces, as the skin and mucous membranes generally. Hence, the turpentines have been administered in affections of the mucous membranes in general; and of the urinary organs in particular.

None of the turpentines are, however, much used, in consequence of their virtues being wholly possessed by the volatile oil, under which the diseases will be mentioned in which they are prescribed.

Their dose is from a scruple to a drachm. They may be made into *pills* with powdered liquorice; into an *emulsion* with mucilage of gum arabic or yolk of egg, sugar, and mint water; or into an *electuary* with honey or molasses.

If Bordeaux turpentine be mixed with about one-twenty-eighth part of its weight of calcined magnesia, it solidifies in about twelve hours,—the acid resins combining with the magnesia, and forming solid resinates, which absorb the volatile oil.

An *emulsion* of the turpentines may also be thrown into the rectum as an excitant injection, when it is desirable to induce catharsis and revulsion at the same time, as in comatose affections.

They enter into the composition of certain plasters.

a. **O'LEUM TEREBIN'THINÆ, OIL OF TUR'PENTINE.**—This oil is prepared on the large scale, and is, consequently, not in the list of preparations, but in that of the materia medica of the Pharmacopœia of the United States, as well as of the pharmacopœias of Europe. All the turpentines yield it; but in this country it is prepared chiefly from *Pinus Palustris*, which affords about 17 per cent., and from which it is distilled in large quantities in North Carolina, not only for home consumption, but for exportation. The residue in the still, after the distillation of the oil, is *resin*. In the British Colleges, oil of turpentine is directed to be redistilled; but in this country it can always be had sufficiently pure for medical use; so that the apothecary rarely has recourse to a hazardous process; and, accordingly, no formula for its rectification is given in the Pharmacopœia of the United States.

Pure oil of turpentine is limpid and colorless, having a peculiar penetrating odor, and a hot, pungent, bitterish taste. Its specific gravity is about 0·86. It is highly volatile and inflammable; less soluble in alcohol than most other volatile oils, and very slightly so in water, and in dilute or hydrated alcohol. It is readily soluble in sulphuric ether.

It is a powerful excitant, diuretic, anthelmintic, and in large doses cathartic; but its excitant properties alone fall under consideration here. In small doses—from a few drops to a drachm—it causes a feeling of warmth in the stomach; is absorbed, and passes off by the kidneys, and the different emunctories; so that the cutaneous and pulmonary transpirations have a marked terebinthinate—and the urine a violet—odor; the latter supposed to be owing to a portion of the oil being decomposed.

Owing to its excitant operation, it proves beneficial in chronic inflammations of mucous membranes accompanied by discharges; and, not unfrequently, even in small doses, causes hæmaturia, and great irritation of the urinary organs. These effects are still more marked, when the dose is larger,—from fʒj, for example, to fʒij. In still larger doses, from fʒij to f℥iss, and even more, it induces much concentration of action towards the abdominal viscera; purging at times, and passing off freely by all the excretions, so as to impregnate the air of the chamber with its odor;—in some cases, disordering the encephalic functions, but not causing any permanent ill effects. It has been given to the extent of three fluidounces without injury.

Oil of turpentine is used as an internal excitant in protracted fevers accompanied by adynamic symptoms; especially if, at the same time, there be meteorism or ulceration of the intestines. On the authority of Dr. Wood, of Philadelphia, it is affirmed that there is a particular state of fever, usually attended with much danger, in which the remedy has been found uniformly successful:—this is in the latter stages of typhoid fevers, or lingering remittents, "in which the tongue, having begun to throw off its load of fur in patches, has suddenly ceased to clean itself, and becomes dry and brownish. The skin is at the same time dry, the bowels torpid and distended with flatus, and the patient sometimes affected with slight delirium. Under the use of small doses of turpentine, frequently repeated, the tongue becomes moist and again coated, the tympanitic state of the bowels disappears, and the patient goes on to recover as in a favorable case of fever." Dr. Wood is disposed to ascribe the effect to a healthy change produced by the oil on the ulcerated surface of the intestines; but the author has seen its excitant influence exhibited in similar cases, when there was no reason to believe in the presence of intestinal ulceration; whilst his experience has not led him to corroborate the strongly-expressed testimony of Dr. Wood in regard to its efficacy in typhoid fever, under the very circumstances pointed out by that gentleman; and such has been the case with other observers.

In similar conditions of yellow, puerperal, and eruptive fevers, the internal use of the oil is said to have been found beneficial.

Like copaiba, oil of turpentine has been serviceable in chronic dysentery and diarrhœa; in chronic blennorrhœa and leucorrhœa—less so, however, in the last affection, as has been shown to be the case with copaiba—and in chronic inflammation of the bladder; but in the last disease its administration requires caution, as it is apt, especially if the quantity be too great, to excite increased irritation. In chronic rheumatism, it has been more largely employed than any other remedy; and in sciatica, and other neuralgic affections, the benefit obtained from it is often marked. It acts probably, in such cases, as a revellent, by its excitant effect upon the kidneys and urinary apparatus in general.

It is occasionally, but rarely, given as a carminative; the ordinary essential oils appearing to be productive of as much service; whilst they are agreeable, and consequently preferable.

It can be readily seen, that its excitant influence, like that of other essential oils, and local stimulants, may be invoked in many cases, where it is desirable to induce a revellent action, with the view of breaking in upon any diseased condition.

Externally, oil of turpentine is employed extensively as a rubefacient. In protracted and typhoid fevers, it is applied hot or cold to the extremities; and in chronic rheumatism, paralysis, cynanche, puerperal peritonitis, and, whenever it is desirable to excite cutaneous revulsion, it is constantly prescribed, either alone or associated with olive oil, which renders its action milder.

In those cases of extensive burns and scalds, that are accompanied by much constitutional depression, oil of turpentine has been found a most valuable local excitant; as well as in gangrenous conditions in general, where the object is to restore the part from a state of suspended animation.

Oil of turpentine is the principal ingredient in *Whitehead's Essence of Mustard*, which consists of it, camphor, and a portion of spirit of rosemary, to which is added a small quantity of flour of mustard. This is a celebrated rubefacient application in chronic rheumatism, neuralgia, &c. *St. John Long's Liniment*, which acquired so much notoriety upwards of thirty years ago, is said to have consisted of oil of turpentine and acetic acid, held in suspension by yolk of egg.

United with olive oil (*Ol. terebinthin.* ʒj; *Ol. olivæ*, ʒvij), and introduced into the meatus auditorius externus on cotton, it is occasionally useful as an excitant, where there has been a deficient secretion of cerumen.

Oil of turpentine is likewise administered in many cases, with marked advantage, in the form of enema. In amenorrhœa, its excitant influence has, in this way, been beneficial by contiguous sympathy. In fevers, accompanied by meteorism, and in comatose affections, where it is desirable to induce a revellent action on the lower part of the intestinal canal, it is often highly serviceable. Its employment in this form has, however, fallen under consideration already, when treating of CATHARTICS.

The ordinary dose as an excitant in fever, or chronic *catarrh* of the mucous membranes, and in chronic rheumatism, is from ♏v to fʒj; but even in the smallest doses, it gives occasion, at times, to bloody urine, and to nephritic and vesical irritation. Some, however, administer it in those diseases to the extent of fʒj to fʒij.

It may be taken in molasses, or dropped in some aromatic water, to which a hot aromatic or bitter tincture has been added—as tincture of capsicum or tincture of gentian—to conceal its taste. It is more commonly, however, given in emulsion, in the following prescription: (*Ol. terebinthin.* fʒj—ʒiij; *Vitell. ovi*, seu *Mucilag. acaciæ* fʒiij; *Aquæ menthæ piperitæ* f℥iv. M. Dose, a fourth part.)

When given in enema, the quantity of the oil may be increased, and water may be substituted for the aquæ menthæ piperitæ. A form for an enema of this kind—ENEMA TEREBINTHINÆ—is officinal in the Pharmacopœias of London, Edinburgh, and Dublin. In the first of these it is directed to be made by rubbing a fluidounce of *oil of turpentine* with the *yolk* of one egg, and mixing therewith nineteen fluidounces of decoction of barley.

Turpentine enters into the composition of *Emplastrum Galbani Compositum*, and *Oil of Turpentine* into that of *Linimentum Cantharidis*, of the Pharmacopœia of the United States.

LINIMEN'TUM TEREBIN'THINÆ, LIN'IMENT OF TUR'PENTINE.—(*Ol. terebinthin.* Oss; *Cerat. resin.* ℔j.) This was the liniment originally proposed by Mr. Kentish for the treatment of burns and scalds. It is spread upon lint, and kept on until the peculiar inflammation excited by the fire has been removed. It may then be continued, or milder dressings be substituted, as the case may seem to demand. It may, also, be applied in cases of gangrenous or sloughing ulcers, or wherever a topical application of the kind is needed.

b. **RESI'NA, RESIN, ROSIN.**—This is the residuum after the distillation of the volatile oil from the turpentine of *Pinus palustris*, and other species of Pinus. When the distillation is not carried too far, the resin contains a little water. This is the officinal article—**RESINA**—of the Pharmacopœia of the United States—*Resina flava*, *yellow resin* or *rosin*. If, when in a state of fusion, it be strongly agitated with water, it acquires a distinct appearance, and is called *Resina alba*, *white rosin*. This, according to Dr. Christison, is the resin of pharmacy; but it is not so in this country. A more continued heat than that prepared in making yellow rosin, expels the water, and produces *transparent rosin ;* and if the process be pushed as far as it can be, without prducing a complete alteration of properties, the residue acquires a deeper color, and is termed *brown* or *black rosin*, *colophony*, *fiddler's rosin*. If melted rosin be run into cold water contained in shallow tanks, and a supply of cold water be kept up until the rosin has solidified, a pale yellow product is obtained called *Flockton's patent rosin*. (Pereira.)

Resin, and the resins in general, are insoluble in water; but are dissolved by alcohol, ether, and the essential oils,—the solutions in alcohol and ether affording precipitates on the addition of water. They unite with wax and the fixed oils by fusion, and form soaps with the caustic alkalies.

Yellow resin, as usually met with, is opaque, and of a yellow or yellowish-white color. White resin differs from the yellow in being opaque and whitish,—properties which are owing to the water with which it is incorporated, and which gradually escapes on exposure, leaving it more or less transparent.

Resin is never given internally. Its main use is to form plasters and ointments, to which it is an excitant ingredient, and it renders them more adhesive.

CERA'TUM RESI'NÆ, RESIN CERATE, *Basilicon ointment.*—(*Resin.* ℥v; *Adipis* ℥viij; *Ceræ flavæ* ℥ij.) A mild excitant ointment to indolent ulcers; to blistered surfaces to keep up a discharge, and to ulcers which follow burns.

CERA'TUM RESI'NÆ COMPOS'ITUM, COMPOUND RESIN CERATE.—(*Resin.*, *Sevi*, *Ceræ flavæ* āā ℔j; *Terebinth.* ℔ss; *Ol. lini* Oss.) This ointment is somewhat more excitant than the preceding. It is employed in some parts of the United States under the name of *Deshler's Salve.*

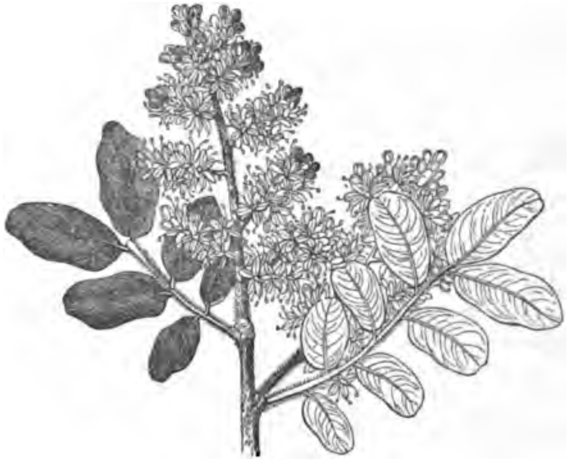
Besides these, resin enters into the composition of *Ceratum Cantharidis*, *C. Resinæ*, *C. Sabinæ*, *Emplastrum Belladonnæ*, *E. Hydrargyri*, *E. Resinæ*, and *Unguentum Cantharidis.*

84. COPA'IBA.—COPA'IBA.

The juice of *Copaïfera officinalis* and other species of *Copaïfera*, Sex. Syst. Decandria Monogynia; Nat. Ord. Leguminosæ, natives of South

America, is commonly known under the name *Balsam of Copaiva* or *Copaiva Balsam*, vulgarly pronounced *Cope'vē.* It is obtained by making incisions into the stems of the trees; from which it flows copiously; and the incisions are repeated several times in the course of the season. It would seem to be collected in greatest quantity in the province of Para, in Brazil; and is imported into the United States almost wholly from the port of Para, in small casks or barrels. (Wood and Bache.) A considerable quantity, according to Dr. Pereira, is imported into England through New York. It is a yellowish transparent liquid, of the consistence of syrup or olive oil, and a specific gravity varying from 0·950 to 1·000; rarely, perhaps, as high as the latter, unless after long keeping. Its odor is peculiar, and taste somewhat pungent, bitterish, and nauseous. It is not soluble in water; but is wholly so in alcohol, ether, and the fixed and volatile oils. With the alkalies it forms a soap, which is insoluble in water. The tests of its purity, as laid down by the Edinburgh College, are the following: "transparent; free of turpentine odor when heated; soluble in two parts of alcohol; it dissolves a fourth of its weight of carbonate of magnesia, with the aid of a gentle heat, and continues translucent." It is not often adulterated in this country.

Fig. 130.



Copaifera Langsdorffii.

The chief constituents of copaiba are volatile oil and resin. It contains no benzoic acid; and is, therefore, not properly a balsam, under the modern definition of the word. It more nearly resembles, in its chemical and medicinal properties, the turpentines. By distillation, a volatile oil—**O'LEUM COPA'IBÆ**—is obtained from it, which is officinal in the Pharmacopœias of London, Edinburgh, and the United States, and is preferred, by some, as a medicinal agent to any other form of preparation.

The quantity of volatile oil varies according to the specimen of copaiba; but the average produce has been estimated at from 40 to 45 per cent. (Pereira.) After the oil has passed over, a resin of copaiba remains which consists of two resins—one called *Copaivic acid*, and the other *Viscid resin of Copaiva;* but these last constituents are of no pharmacological interest. The following analyses are cited by Dr. Pereira:

	STOLZE'S ANALYSIS.	GERBER'S ANALYSIS.	
		Fresh Balsam.	Old Balsam.
Volatile oil,	38·00	41·00	31·70
Yellow hard resin (*Copaivic acid*),	52·75	51·38	53·68
Brown soft resin,	1·66	2·18	11·15
Water and loss,	7·59	5·44	4·10
Balsam of Copaiba,	100·00	100·00	100·63

It is not many years since it was discovered, that if magnesia be triturated with copaiba, and the mixture be set aside, it will gradually assume such a consistence as to admit of being made into pills. A formula for such pills is officinal in the Pharmacopœia of the United States.

The effect of copaiba on the human frame, like that of the oleoresins—as the turpentines—is unquestionably excitant. It occasions, when swallowed, a sense of heat in the pharynx, œsophagus, and stomach, giving rise to eructations of the characteristic flavor of copaiba; and, in overdoses, to nausea and vomiting. With some persons, the smallest quantity produces those effects, which is a strong objection to its administration in an uncombined form. It is also apt to induce a form of urticaria, which passes away when the copaiba is discontinued. Its action is not confined to the gastro-enteric mucous surfaces. It is presumed, by many, to affect, more or less, all the mucous membranes, and accordingly, it is extensively employed in chronic inflammations of those parts. The oil is likewise taken up into the bloodvessels of the stomach and intestines; and proceeds to the kidneys, where it is separated along with the urine, exciting, at times, nephritis, hæmaturia, and ischuria, with occasional irritation of the urethral mucous membrane. It is, likewise, exhaled along with the pulmonary transpiration, and its odor is distinctly perceptible in the breath. Where unusually large doses of copaiba are taken, all those symptoms are greatly aggravated. It is affirmed, too, that under its use pains of a rheumatic character have supervened, which there was great reason to ascribe to its agency.

The principal therapeutical employment of copaiba is unquestionably in inflammatory affections of the genito-urinary organs, and especially in gonorrhœa. In the last disease, it probably acts mainly as a revellent by the impression which it makes on the mucous membrane of the stomach and intestines, and likewise on the kidneys; and it is not improbable, in the more chronic form of mucous discharges, that the excitant virtue of the oil, which becomes separated with the urine, may exert a beneficial action on the diseased surface with which it comes in contact. With most modern writers, indeed, copaiba is one of the main agents in the revellent treatment of gonorrhœa. The author has elsewhere stated (*Practice of Medicine*, 3d edit. ii, 371, Phila., 1848), that after the active symptoms of gonorrhœa have passed away under a simple antiphlogistic management, the revellent treatment becomes advisable. This consists in the administration of substances, that, either by their operation on the kidneys, or on the diseased mucous membrane itself, induce a new action in it. Many practitioners are in the habit, however, of administering copaiba freely from the first, paying no regard to any antiphlogistic treatment; but although this plan may occasionally prove successful, it has been found, at times, to augment the inflammatory symptoms, and the discharge. Its efficacy is, doubtless, more manifested, and its employment more philosophical, when prescribed after an appropriate antiphlogistic treatment.

In the gonorrhœa of females, copaiba and the different revellent antigonorrhœal remedies appear to be of limited efficacy. Gonorrhœa in the female, affects, in reality, the vagina rather than the urethra; and we can, therefore, comprehend, that the effect of its revulsive agency on the kidney may be less marked than when the disease is confined to the lining membrane of the urethra, as in the male. In chronic inflammation of the bladder, it has been prescribed; but its effects have to be watched, or it may add materially to the inflammation.

As in gonorrhœa of the female, so in leucorrhœa, it cannot be expected, that copaiba will afford essential benefit. Cases, indeed, are recorded of advantage from it; but it is not much relied on. The same may be said of it in chronic bronchitis, in which it has been extolled by many practitioners. Its agency, in these cases also, is probably revellent, by exciting the lining membrane of the stomach. Nor can it be expected, that the small quantity exhaled along with the bronchial or pulmonary transpiration can exert much influence. This is a topic, however, which is investigated under the head of EXPECTORANTS.

In cases of chronic inflammation of the mucous membrane of the bowels, more effect may be expected from it, inasmuch as it can come into immediate contact with the seat of the disease. It is true, that where this is low down in the bowels, the copaiba will probably be despoiled of the greater portion of its oil, before it reaches it; but still sufficient may remain, and the resin of copaiba will certainly pass through. Testimony has been adduced by a respectable physician, Dr. La Roche, of Philadelphia, in favor of its beneficial influence in cases of chronic inflammation of the colon and rectum; and it is said to have been useful in hemorrhoids, both when employed in small doses internally, and when applied to them externally, after the activity of the inflammatory stage had passed away.

Like the balsams, it has occasionally been prescribed as a topical excitant to ulcers; but at the present day it is rarely, or never, employed. It has also been found serviceable by Dr. Ruschenberger, U. S. N., as an application to chilblains.

These are the chief cases in which its excitant agency has been invoked.

The ordinary dose is from ♏x to f℥j, and even more, two or three times a day. It is commonly given dropped on sugar; but its taste is so repulsive, that it is often advisable to adopt other forms, with the view of concealing it; and, at the same time, of correcting its effects upon the digestive organs. The following is an *unpharmaceutical* compound, which has often been prescribed in gonorrhœa; the spirits of nitre and lavender being added to correct the taste;

and the opium, to prevent nausea or catharsis. (*Copaibæ*, *Sp. Æther. nitric.* āā f℥ss; *Acaciæ* pulv., *Sacchari*, āā ʒj; *Sp. Lavandul. comp.* fʒij; *Tinct. opii* fʒj; *Aquæ destillat.* f℥iv.—M. The dose of this is a table-spoonful three times a day.) Many of the more recent writers, however, prefer to direct it alone, in wine or lemonade, or dropped in a wine-glassful of water, to which a little compound tincture of gentian has been added.

Where copaiba is given from the commencement of the disease, it is usually in the dose of a fluidrachm or more, two or three times a day; and with the view of cutting it short at the very onset, it has been proposed to administer as much as from fʒij to f℥j, for a dose. Occasionally, it is prescribed in the form of emulsion, made with mucilage not too thick; or yolk of egg,—the vehicle being cinnamon, peppermint, or other aromatic water.

O'LEUM COPA'IBÆ, OIL OF COPA'IBA (obtained by distilling *copaiba* and *water*, separating the *oil* that comes over from the latter).—This preparation has been admitted into the last edition of the Pharmacopœia of the United States (1851). Dose, ten or fifteen drops. Dr. Pereira states that he has known fʒij taken at once without any injurious consequences. It may be dropped on a lump of sugar; but it has not been much used in this country.

PIL'ULÆ COPA'IBÆ, PILLS OF COPA'IBA.—(*Copaib.* ℥ij; *Magnes.* recentè præparat. ʒj; mix and set aside, till the mixture concretes into a pilular mass: to be divided into 200 pills.) Each of these pills contains between four and five grains of copaiba; so that from two to six or more may be given for a dose, two or three times a day.

This is preferred, by some, to any preparation of the article.

Capsules made of gelatin and enclosing copaiba have been introduced, with the view of obviating the taste. Each of these usually contains about ten grains of the copaiba; and is of a size, which can generally be swallowed without difficulty. The capsules are digested. The processes for their formation are described in the work of Messrs. Mohr and Redwood, *Practical Pharmacy*, Amer. edit., by Wm. Procter, Jr., p. 510, Philad. 1849.

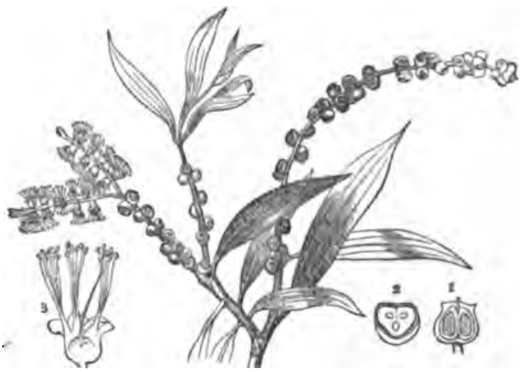
Copaiba has been administered in enema; and it is affirmed on good authority,—that of M. Velpeau,—that this form may be substituted in all cases, in which its employment is considered to be indicated. The author has rarely used it in this manner. It has been proposed to introduce the gelatinous capsules into the rectum; but it is not easy to see, why an expensive form of preparation should be employed,—seeing that the reasons, which suggested the use of the capsules, cannot apply to the administration of copaiba by the rectum.

35. O'LEUM CAJUPU'TI.—CAJ'EPUT OIL.

Cajeput oil is the volatile oil of the leaves of *Melaleuca cajuputi*; SEX. SYST. Polyadelphia Icosandria; NAT. ORD. Myrtaceæ. It is in the secondary list of the Pharmacopœia of the United States.

The species of melaleuca, from which the oil is obtained, is a native of the Moluccas. The oil is procured from the leaves by distillation, chiefly at Amboyna and Bourou; and is usually imported from India in green glass bottles, similar to long-necked beer bottles. In the year 1834, it was much extolled in England in cases of cholera; in consequence of which a great demand was caused for it, and the price rose from two to fourteen shillings an ounce. Various imitations, accordingly, appeared in the market. One of these consisted of oil of rosemary, flavored with camphor and oil of cardamom, and colored. (Pereira.) It would not seem, however, that it is often adulterated. The appearance of the oil is limpid, and of a green color, but, when rectified, it is colorless. Its odor is strong and penetrating; and resembles that of a combination of camphor, rosemary, and cardamom. The taste is warm and pungent.

Fig. 131.



Melaleuca cajuputi.

1, 2. Ovary. 3. Calyx and stamens.

Like the other essential oils, cajuput oil is excitant; but as its impression is more powerful on the gustatory nerves than the aromatic oils in general, it has been employed, likewise, as an excitant antispasmodic. It acts as a diffusible stimulant; and hence, like the essential oils in general, is adapted not only for cases of flatulent colic and tormina, but in India and Europe, as well as in this country, has been given in low protracted fevers, and in paralytic affections: it is not much employed, however, and appears not to be possessed of any virtues that especially recommend it as an internal excitant. As a local excitant, it is more frequently prescribed—in cases, for example, of paralysis of the tongue; and is introduced into the hollow of the tooth in carious odontalgia. When mixed with an equal portion of olive oil, it is used as an embrocation, in chronic rheumatism, and painful affections in general, local paralysis, &c.; but even for this purpose, it does not seem to possess any virtues over other excitant agents—as the terebinthinates.

The dose is from one to five drops or more on sugar, or formed into a mixture.

86. SUC'CINUM.—AMBER.

Amber is found in various parts of the world; but the principal portion of that which is met with in commerce is cast ashore on the coast of the Baltic between Königsberg and Memel. It is supposed to be disengaged from lignite by the action of the sea. It has been found in Maryland and New Jersey,—in the former state, associated with iron pyrites and lignite. The amber, however, which is used in this country, is imported from the shores of the Baltic. (Wood & Bache.) It usually occurs in irregularly-shaped pieces, of a pale golden yellow, but, occasionally, of a reddish-brown, and even deep-brown color. It is insipid, and inodorous, except when heated or rubbed; when it exhales a peculiar, aromatic, not disagreeable smell. It is usually translucent; at times, opaque or transparent. Its specific gravity is about 1·078. It is brittle, and has a conchoidal fracture; is insoluble in water, and is very slightly acted on by alcohol.

When subjected to examination, its proximate constituents are found to be volatile oil, two resins, a bituminous substance, and a peculiar acid, called *succinic.*

Amber is possessed of excitant properties, and was formerly given in the dose of 10 grains to ℈j in powder. It is never, however, used in this country, except in pharmacy and the arts.

O'LEUM SUC'CINI, OIL OF AMBER.—(*Succin.* pulv. q. s. Put the amber, previously mixed with an equal weight of sand, into a glass retort, which is to be only half filled; distil by means of a sand-bath, with a gradually increasing heat, an acid liquor, an oil, and a concrete acid impregnated with oil. Separate the oil from the other matters, and keep it in well-stopped bottles.)

O'LEUM SUC'CINI RECTIFICA'TUM, REC'TIFIED OIL OF AMBER.—(*Ol. succin.* Oj; *Aquæ* Ovj. Distil until four pints of the water have passed over with the oil into the receiver; then separate the oil, and keep it in well-stopped bottles.)

Oil of amber, as found in the shops, has a strong, peculiar odor, and a pungent, acrid taste. It is nearly colorless, when first redistilled, but gradually becomes brown. It is soluble in absolute alcohol in all proportions; and imparts its properties, in some degree, to water.

It is a nauseous excitant, and possesses the usual properties of the essential oils; but, on account of the powerful impression it makes on the gustatory nerves also, it has been prescribed as an antispasmodic, in the dose of from ♏ij to ♏x.

It is occasionally used as a rubefacient in paralysis, chronic rheumatism, and wherever excitant embrocations are indicated.

SUCCINIC ACID, obtained in the distillation of oil of amber, possesses similar properties to the latter, and is officinal in the Dublin Pharmacopœia. It was at one time used as an excitant in rheumatism; but is now never employed.

Besides the vegetable excitants already mentioned, the Pharmacopœia of the United States has the following in its secondary list.

37. CATA'RIA, CATNEP. The leaves of *Nepeta Cataria, Catnep, Catmint;* SEX. SYST. Didynamia Gymnospermia; NAT. ORD. Labiatæ;

are well known in the United States, and much used in domestic practice. They have a strong, peculiar odor; and a bitter aromatic taste, their properties being mainly dependent upon essential oil. Catnep readily yields its virtues to water, and hence the infusion—*catnep tea*—is the form in which it is usually given.

Catnep tea is a common domestic remedy in cases of colic in infants, and some nurses are in the habit of feeding them upon it for the first day or two. It is also used in cases of amenorrhœa. It is scarcely ever prescribed by the physician.

38. HERACLE'UM, MASTERWORT. The root of *Heracleum lanatum*, sometimes called *Cow-parsnip;* SEX. SYST. Pentandria Digynia; NAT. ORD. Umbelliferæ, is a common umbelliferous plant from Canada to Pennsylvania, which flowers in June. The root resembles parsley; has a strong disagreeable odor, and an acrid taste. It is excitant when applied to the skin.

Masterwort is an excitant, and has been used as such in cases of want of tone of the stomach accompanied by flatulence. It has likewise been prescribed in epilepsy, accompanied by the same gastric condition. It may be given in powder or infusion. The author has never used it.

39. SOLIDA'GO, GOLDEN ROD. The leaves of *Solidago odora, Sweet-scented Golden Rod;* SEX. SYST. Syngenesia Superflua; NAT. ORD. Compositæ Corymbiferæ,—a plant, which grows in woods and fields throughout the United States, and flowers in September,—have an agreeable fragrant odor. They yield, on distillation, a volatile oil, which possesses the taste and aroma of the plant in a high degree, and on which its therapeutical virtues are dependent.

Golden rod has all the excitant virtues of the aromatic herbs,—being carminative, and an excitant diaphoretic when given in warm infusion; in which form it is also administered as an excitant to the gastric functions. An essence, made by dissolving the essential oil in dilute alcohol, is used in the Eastern States as a remedy in complaints arising from flatulence; and as a vehicle for disagreeable medicines of various kinds. The dried flowers are said to be a substitute for common tea.

40. AL'COHOL.

Alcohol, in pharmacy, means 'rectified spirit,' of the specific gravity 0·835.—*Dilute alcohol*, **AL'COHOL DILU'TUM**, consists of equal portions, by measure, of *alcohol* and *distilled water*. Its specific gravity is 0·935. These are the menstrua, which are employed in the formation of tinctures, and other preparations, referred to in the course of the present work. In this place, the use of the various alcoholic liquors, as excitants, has to be treated of. These may be divided into three classes: *Ardent Spirits, Wines*, and *Malt Liquors*.

a. ARDENT SPIRITS.

Ardent spirits are obtained from the distillation of vinous liquids; and the resulting spirit differs according to the precise vinous liquid that may be employed in the distillation. For example, the spirit obtained from the distillation of the fermented juice of the grape is Brandy, **SPIRITUS VINI GALLICI**, of the Pharmacopœias of the United States and London; that which is obtained from molasses is Rum; that from a fermented infusion of grain, Corn Spirit; from one of rice or toddy, Arrack; from peach juice fermented, Peach Brandy; from cider fermented, Apple Brandy; whilst Gin, Hollands, Scotch, and Irish Whisky, are corn spirit flavored. All these contain various proportions of alcohol, volatile oil, water, and frequently—as in brandy and rum—coloring matter, the volatile oil communicating to the particular spirit the aroma by which it is distinguished. These spirits differ greatly from each other as to the quantity of alcohol which they contain. From experiments on some of them by Mr. Brande, the following was the average quantity, s. g. 0·825, obtained at 60° Fahr.

	Alcohol by measure.		*Alcohol by measure.*
100 parts by measure of		100 parts by measure of	
Brandy contain . . .	55·39	Whisky (Scotch) contain . .	54·32
Rum "	53·68	Whisky (Irish) " . .	53·90
Gin "	51·60		

b. WINES.

Of the varieties of wine as regards their dietetic uses, and the marked differences that exist between them, the author has treated at length in another work, to which the reader is referred. (*Human Health*, p. 308, Philad., 1844.) It will be sufficient here to point out their relative qualities as excitants. When subjected to analysis, they afford nearly the same products. They contain much water; alcohol in variable quantity; mucilage; tannic acid; a blue coloring matter, which becomes red, when it unites with acids; a yellow coloring matter; bitartrate of potassa; tartrate of lime; acetic acid; and, at times, other salts,—as chloride of sodium, and sulphate of potassa. It is to the alcohol that they owe their strength: the more abundant it is, the more generous the wine. The mucilage communicates no particular property to them; the tannic acid gives them a kind of roughness, and the power of being clarified by a solution of glue, or of white of egg; and the bitartrate of potassa, and the acetic acid give them tartness; so that they acquire value by being kept, not only because their principles undergo modification in their combination, but because tartar is deposited.

The following table was drawn up by Professor Brande from the results of his experiments on various wines. It is proper, however, to remark, that many of them were prepared expressly for the London market, and are more brandied or "reinforced" than the same varieties sold in the United States. This is strikingly the fact with port. Dr. Henderson, too, has remarked, that some of the wines, analyzed by Mr. Brande, were mixed with a considerable quantity of adventitious alcohol. His additions and corrections have the letter H. affixed.

Proportions of Alcohol, S. G. 0·825, in one hundred parts by measure of the following Wines and Malt and Spirituous Liquors.

1.	Lissa,		26·47
	do.		24·35
	Average,	(*a*)	25·41
2.	Raisin Wine,		26·40
	do.		25·77
	do.		23·20
	Average,		25·12
3.	Marsala,		26·03
	do.		25·05
	Average,	(*b*)	25·09
4.	Port—average of six kinds,		23·48
	do.—highest,		25·83
	do—lowest,		21·40
5.	Madeira,		24·42
	do.		23·93
	do (Sercial),		21·45
	do.		19·24
	Average,		22·27
6.	Currant Wine,		20·55
7.	Sherry,		19·81
	do.		19·83
	do.		18·79
	do.		18·25
	Average,		19·17
8.	Teneriffe,		19·79
9.	Colares,		19·75
10.	Lacryma Christi,		19·70
11.	Constantia—white,		19·75
	red,	(*c*)	18·92
12.	Lisbon,		18·94
13.	Malaga,		18·94
14.	Bucellas,		18·49
15.	Red Madeira,		22·30
	do.		18·40
	Average,		20·35
16.	Cape Muscat,		18·25
17.	Cape Madeira,		22·94
	do.		20·50
	do.		18·11
	Average,		20·51
18.	Grape Wine,		18·11
19.	Calcavella,		19·20
	do.		18·10
	Average,		18·65
20.	Vidonia,		19·25
21.	Alba Flora,		17·26
22.	Malaga,		17·26
23.	White Hermitage,		17·43
24.	Roussillon,		19·00
	do.		17·26
	Average,		18·13
25.	Claret,		17·11
	do.		16·32
	do.		14·08
	do.		12·91
	Average,	(*d*)	15·10
26.	Malmsey Madeira,		16·40
27.	Lunel,		15·52
28.	Scheraaz,		15·52
29.	Syracuse,		15·28
30.	Sauterne,		14·22
31.	Burgundy,		16·60
	do.		15·22
	do.		14·53
	do.		11·95
	Average,		14·57
32.	Hock,		14·37
	do.		13·00
	do. (old in cask),		8·88
	Average,		12·08
	Rudesheimer (1811),	H.	10·72
	do. (1800),	H.	12·22
	Average,	H.	11·47
	Johannisberger,	H.	8·71
33.	Nice,		14·63
34.	Barsac,		13·86
35.	Tent,		13·30
36.	Champagne (still),		13·80
	do. (sparkling),		12·80
	do. (red),		12·56
	do.		11·30
	Average,		12·61
37.	Red Hermitage,		12·32
38.	Vin de Grave,		13·94
	do.		12·80
	Average,		13·37
39.	Frontignac,		12·79
40.	Côte Rôtie,		12·32
41.	Gooseberry Wine,		11·84
42.	Orange Wine—average of six samples made by a London manufacturer,		11·26
43.	Tokay,		9·88
44.	Elder Wine,		9·87
45.	Rhenish Wine,	H.	8·71
46.	Cider—highest average,		9·87
	lowest,		5·21
47.	Perry—average of 4 samples,		7·26
48.	Mead,		7·32
49.	Ale (Burton),		8·88
	do (Edinburgh),		6·20
	do. (Dorchester),		5·56
	Average,		6·87
50.	Brown Stout,		6·80
51.	London Porter (average),		4·20
	do. Small Beer (average),		1·28
52.	Brandy,		53·39
53.	Rum,		53·68
54.	Gin,		51·60
55.	Scotch Whisky,		54·32
56.	Irish do.		53·90

(*a*) 15·90 H. (*b*) 18·40 H. (*c*) 14·50 H. (*d*) 12·91 H.

All wines are necessarily excitant by reason of the alcohol which they contain; but some are more so than others. There are but few, however, which are employed therapeutically as excitants. These are chiefly SHERRY, **VINUM ALBUM** of the Pharmacopœia of the United States, MADEIRA, and PORT—**VINUM RUBRUM** of the Pharmacopœia of the United States. Sherry is the VINUM ALBUM HISPANICUM of some pharmacopœias. It is almost wholly free from acidity, and consequently well adapted for the dyspeptic and gouty. Madeira wines are more acid; and those of Oporto or Port abound in astringency; they are, therefore, preferred in diseases in which an astringent and excitant agency is needed. They are apt to disagree with the dyspeptic, owing, perhaps, to the gallic acid which they contain. The brisk WINES OF CHAMPAGNE; the heady WINES OF BURGUNDY; the light WINES OF BORDEAUX, and of the RHINE and MOSELLE are not often given, with us, as excitants; yet Dr. Henderson affirms, that in certain species of fever, accompanied by a low pulse, and great nervous exhaustion, they have been found to possess considerable efficacy, and may be prescribed with more safety than most other kinds.

c. MALT LIQUORS.

Malt liquors differ from wines chiefly in the following points. They contain a much greater proportion of nutritive matter, and less alcohol; but they have, in addition, a peculiar bitter and perhaps narcotic principle, derived from the hop. Without the hop, the ale would not keep, especially that intended for the warmer climates; and hence the *pale ale*, intended for the India market, is always made intensely bitter with hop. Independently of the flavor and tonic properties, which hops communicate, they precipitate, by means of their astringent principle, the vegetable mucilage, and thus remove from the beer the active principle of its fermentation; consequently, without hops, malt liquors would have to be drunk either new and ropy or old and sour. (Paris.) They are unquestionably nutritive; and in the system of "training" for athletic exercises, which consists in raising the powers of the individual to the full extent of which they are capable, about three pints a day of mild home-brewed ale are recommended for drink. Malt liquors do not digest well, however, with those of weak digestive powers. The extractive is apt to produce flatulence and heartburn.

In regard to alcohol, it is rarely administered internally as an excitant. When it is indicated, some form of ardent spirits is usually chosen; and of these brandy is most commonly selected. Frequently, however, in remote country situations, brandy is not to be met with. In such case, whisky, or peach or apple brandy is employed. In small quantities, it is taken pure in certain forms of dyspepsia, especially where articles difficult of digestion have been eaten, and gastrodynia results. Occasionally, too, it checks sickness of the stomach, especially sea-sickness; although no permanently good effect can be expected in the last case, until the individual becomes accustomed to the motion of the vessel. In the latter stages of fever, and in adynamic conditions of all kinds, it is much employed; but in fever it is less adapted than wine,—the stimulus of the latter being more permanent and manageable. It may be given in such cases in the form of *toddy*, or spirit and water sweetened, or in that of *milk punch*, where the stomach will bear it; but care must be taken not to hurry too much the organic actions.

The London Pharmacopœia has a MISTURA SPIRITÛS VINI GALLICI, BRANDY MIXTURE, which is an imitation of *egg flip*, and is made as follows:—Take of *Brandy* and *Cinnamon water* each four fluidounces; the *yolks of two eggs; Sugar* half an ounce; *Oil of Cinnamon* two minims. Mix. It is well adapted to the cases mentioned above.

To old drinkers, a small allowance of brandy—two to four ounces in the twenty-four hours—is sometimes advisable in the course of ataxic and adynamic diseases; but the quantity should be gradually diminished, until it is abandoned. It need scarcely be said, that the case must be bad indeed, in which the hopes of the practitioner are placed on the excitement that alcohol is capable of inducing. It may be a question, indeed, whether it be not calculated to exhaust the slight amount of excitability still existing in the system.

It can scarcely be questioned—says a modern writer—Dr. Carpenter—that inanition with its consequent depression of temperature, is the immediate cause of death in various diseases of exhaustion; and it seems probable, that there are many cases in which the depressing cause is of a temporary nature, and in which a judicious and timely application of artificial heat might prolong life, until it has passed off; just as artificial respiration is serviceable in cases of narcotic poisoning. This view, he thinks, has perhaps the strongest claim to reception in those forms of febrile disease, in which no decided lesion can be discovered after death; and he suggests, that the beneficial results of the administration of alcohol in such conditions, and the large amount in which it may be given with impunity, may probably be accounted for on this principle. "That it is a specific stimulus,"—he adds—"to the nervous system cannot be doubted from its effects on the healthy body; but that it serves as a *fuel* to keep up the calorifying process appears equally certain. Now its great efficacy in such cases seems to depend upon the readiness with which it will be taken into the circulation by a simple act of endosmotic imbibition, when the special absorbent process dependent upon the peculiar powers of the cells of the villi is in abeyance. There is no other combustible fluid, whose density relatively to that of the blood, will permit of its rapid absorption by the simple physical process adverted to."

Perhaps in delirium tremens alcohol is most largely depended upon by some practitioners; yet,—as elsewhere remarked,—the disease is certainly, in the generality of cases, best treated eclectically. The recuperative powers of the system are usually sufficient to restore the individual. Some, however, give ardent spirit freely—an ounce or two every hour;—and, doubtless, under this stimulation, the individual may often be restored to the condition in which he was prior to the withdrawal of the stimulus that gave rise to the disease.

Externally, alcohol is much employed as an excitant to inflamed parts, where the hyperæmia affects the skin more especially,—as in erysipelas; in burns and scalds when the epidermis is not removed; and in sprains and bruises. Not only does it act as an excitant, when first applied in such cases, but during its evaporation it causes an agreeable sense of coolness in the affected parts. Largely diluted with water, it forms an excellent collyrium in chronic conjunctivitis.

Owing to its excitant properties, when applied to vessels that are the seat of hemorrhage, it coagulates the albumen, at the same time constringing the vessels, and thus acts as a styptic; and it is occasionally used as an excitant injection for the radical cure of hydrocele. Rubbing the limbs or body with spirit—as with whisky—is not unfrequently had recourse to, in order to arouse the powers of the system generally, or those of some internal organ.

In regard to the therapeutical use of wine, it is decidedly the best stimulant in long-protracted fevers. It is much more permanent in its action than ardent spirit, and its strength can be regulated, so that under careful watching no bad effects can easily result from its use. The phenomena, that render it advisable in fevers, are,—signs of great prostration; and those that show that it is proper for the patient are,—its being relished by him; agreeing with the stomach; not increasing the heat of the skin, or dryness of the tongue; and the general feelings and condition becoming ameliorated.

Any of the three stronger wines—Sherry, Madeira, or Port—may be prescribed; but unless there is a morbid complication, which requires the astringency of the last, Sherry is to be preferred. It may be given mixed with an equal quantity of water, sweetened, if the patient prefers it, or in the form of *wine whey*. Four ounces, in the course of the twenty-four hours, may be prescribed, should doubt exist as to the propriety of its administration; and if it agrees, the quantity may be gradually augmented. In highly adynamic states, as in malignant typhus, a bottle or two may be allowed in the day with manifest advantage. Should it appear to disagree, it may be discontinued gradually. Great caution is, however, needed in the exhibition of this, as well as of other excitants, in fever; and upon the whole we may say of it—with a modern writer—Dr. A. T. Thomson—as of every other potent article, that "it is a medicine or a poison, according to the discretion and moderation with which it is used; and the skill and judgment which direct its medicinal employment."

Malt liquors are not much employed therapeutically as excitants; but bottled ale and porter occasionally are, in adynamic conditions, that fall under the care of the surgeon more especially, as in local gangrene, sloughing ulcers, &c. Occasionally, the bottled liquors agree with the dyspeptic,—apparently owing to the carbonic acid which they contain,—when the still malt liquors could not be taken with impunity.

41. ÆTHER.—ETHER.

Ethers are formed by the action of various acids on alcohol; and they differ in their sensible, but not materially in their medical properties, according to the acid employed. Hence, but two are contained in the Pharmacopœia of the United States;—the *Sulphuric* and the *Nitric*.

Ether, or sulphuric ether, is formed by the action of sulphuric acid on alcohol; but when prepared in this manner, the distilled liquor contains alcohol, water, sulphurous acid, and oil of wine. To rectify it, potassa, or carbonate of potassa, was directed to be added to it, and that it should be redistilled. The product was ÆTHER SULPHURICUS RECTIFICATUS, of the former edition of the Pharmacopœia of the United States, and of the British Colleges. In the last editions of the Pharmacopœia of the United States, the addition of the potassa is a part of the process, so that **ÆTHER** of the last edition corresponds with *Æther Sulphuricus* of the edition of 1842, and with *Æther Sulphuricus Rectificatus* of former editions. In this state it wholly evaporates in the air, and when agitated with an equal bulk of water, loses about one-tenth of its volume.

The theory of etherification is very complex, and has occupied the attention of many chemists of distinction. Alcohol, in its pure state, is generally regarded as a compound of ether and water; consequently, if the water be separated by any agency, as by that of sulphuric acid, the ether will remain; but for the mode in which this, and the various accessory reactions are effected, the reader is referred to the works of Liebig, Turner, Pereira, and others.

Ether is a colorless, transparent fluid; of a peculiar penetrating and fragrant odor, and a hot pungent taste, followed by a sense of coolness. The specific gravity of that of the United States Pharmacopœia is 0·750; hence it is extremely volatile. It boils at about the temperature of 96°. When pure and recently prepared, it is neither acid nor alkaline; but by exposure to air and light it absorbs oxygen, by which acetic acid and water are formed. It is sparingly soluble in water,—ten volumes, as already remarked, dissolving one of it. By alcohol it is dissolved in all proportions. It dissolves the volatile oils, and most of the fatty and resinous substances.

The action of ether on the economy is more diffusibly excitant than that of any other article, and, accordingly, its operation is very transient. Hence it is better adapted than alcohol, where the object is to stimulate the stomach, without, at the same time, augmenting the action of the heart and arteries. Accordingly, it is given with great advantage in severe gastrodynia and flatulence. In large doses, it produces intoxication like alcohol, and, in still larger, narcosis. It passes readily into the circulation, and is copiously exhaled with the pulmonary transpiration. Like alcohol, it has been detected in the brains of those who have died after it has been exhibited in large quantity.

The author has treated elsewhere of the use of ether as a narcotic in spasmodic diseases, for which it is better adapted than for diseases of debility; although it is often given in the latter, when the powers of life are flagging; and, too often, where but little expectation of benefit can be expected from the use of any remedies.

The dose is fʒss to fʒij, incorporated with water by rubbing it with spermaceti, in the proportion of two grains to each fluidrachm of ether.

SPIR'ITUS ÆTHERIS COMPOS'ITUS, COMPOUND SPIRIT OF ETHER (p. 413), and **SPIR'ITUS ÆTHERIS NI'TRICI**, or **SPIRIT OF NITRIC ETHER** (p. 298), may be used in the same cases as ether. By reason, however, of their containing more alcohol, they are less diffusible in their action, and, therefore, better adapted for cases in which a more permanent stimulus is needed. The dose is fʒss to fʒiij, repeated as the case may seem to require.

Ether is used as a chemical agent in the preparation of *Acidum Tannicum*, *Extractum Cubebæ Fluidum*, *Extractum Piperis Fluidum*, *Extractum Valerianæ Fluidum*, and *Morphiæ Acetas;* and it enters into the composition of *Collodium*, of the Pharmacopœia of the United States.

42. COLLO'DIUM.—COLLO'DION.

An *ethereal solution of Gun-cotton*,—called, from its adhesive properties, *Collodion* or *Collodium* (κολλα, 'glue,') and *Maynard's Adhesive Liquid*, from Mr. Maynard, of Boston, who brought it into notice in the year 1847,—may be made by dissolving one part of gun-cotton, *Pyroxylin* (French, *Fulmicoton*), in 16 parts of rectified ether. Gun-cotton will also dissolve in equal parts of ether and alcohol, and form as adhesive a solution as that in ether alone. It, of course, dries more slowly, and whilst it may not be as well adapted for holding the edges of incised wounds together as the latter, it may be preferable in certain cases,—as an application to abraded surfaces, for example.

The formula for the preparation of collodium, introduced into the last edition of the Pharmacopœia of the United States (1851), consists in steeping *cotton* in a mixture of *nitre* and *sulphuric acid*, by which the necessary quantity of nitric acid is set free to change the cotton into gun-cotton—a peculiar explosive substance produced by the action of nitric acid upon it. The gun-cotton is then dissolved in *ether*, containing a fortieth part by measure of *alcohol*.

Solution of gun-cotton has been used extensively by the surgeon as an adhesive in cases of solution of continuity,—either applied directly to the part by being brushed over it with a camel's hair pencil, or spread on strips of cotton. On ulcers and abraded surfaces—as in superficial burns—it acts as an excitant; the ether evaporates and a film is left, which protects them against the irritating and desiccative influence of the air. In chronic cutaneous affections, it acts in the same manner, and by its contraction, during the evaporation of the solvent, pressure is exerted on the part, which may be of essential service. In cases of acne and follicular affections of the skin in general, the author has seen advantage from it. Occasionally, it has induced an inflammatory condition of the follicles, and at first seemed to aggravate the affection; but subsequently good has appeared to result from the modified nutrition thus induced. In chapped nipples, advantage has accrued from it; and it has arrested capillary hemorrhage,—as from leech-bites. It has been used too, advantageously, in cases of inflammatory swellings, as in mastitis, orchitis, and bubo.

When applied as a local stimulant to exposed surfaces, it may be diluted with rectified ether or alcohol, should this be desirable.

Its local action resembles that of Tincture of Iodine, and they may be employed in the same cases. (See the author's *New Remedies*, 7th edit. p. 253, Philad. 1856.)

In pharmacy, collodion has been employed as a coating for pills, which are thus prevented from impressing disagreeably the gustatory organs.

A solution of gutta percha—the coagulated juice of *Isonandra gutta*, an East India tree, of the family *Sapotaceæ*—*in chloroform*, of the consistence of melted glue, has been applied with a brush, by Dr. Graves, of Dublin, and by Dr. Sanborn, of Andover, Massachusetts, as a substitute for collodion; than which it is more economical; and it does not evaporate so rapidly. It has been used, also, like collodion, applied to the pustules of small-pox as an ectrotic, and with better effects. Under the name *Traumaticine* it was employed by Dr. Eulenberg, painted on the part daily, in chronic eczema and psoriasis, and the author has seen it so used with advantage.

43. CREASO′TUM.—CRE′ASOTE.

Creasote, in the Pharmacopœia of the United States, is defined to be "a peculiar substance obtained from tar." It is produced artificially during the destructive distillation of organic substances, and is found in pyroligneous acid, Dippel's oil, wood smoke, &c. Its most abundant source is tar or pyroligneous acid, obtained from the wood of the birch. In the neighborhood of Edinburgh, it is procured, according to Dr. Christison, in large quantity and of fine quality from Archangel Tar. It is not prepared by the apothecary, and, therefore, is not amongst the preparations in the Pharmacopœia of the United States, but in the list of the Materia Medica. All the processes for obtaining it are complex; and many of them are given by the author in another work. (*New Remedies*, 7th edit. p. 275, Philad. 1856.)

Creasote is a colorless, transparent, oleaginous liquid, of an odor which is highly characteristic. It is entirely soluble in acetic acid, alcohol, and caustic potassa; and coagulates the albumen of eggs, of the blood, and of albuminous fluids. When dropped on paper, and exposed to heat, it is wholly volatilized, and does not leave a greasy stain. It is powerfully antiseptic, whence its name,—from κρεας, "flesh," and σωτηρ, "preserver." Its specific gravity is generally stated at 1·037, as given by Reichenbach, who discovered it several years ago; but Dr. Christison states, that he has never found it lower than 1·065, or higher than 1·067. Water dissolves $\frac{1}{400}$th part of it, and acquires a peculiar acrid taste, and a powerful smoky smell, which is perceptible when the creasote only forms $\frac{1}{10,000}$th part of it.

Applied locally, creasote is an unquestioned irritant; but upon the tongue, it causes an excessive burning sensation. When applied to a part whence the epidermis has been removed, or to a wound, an extremely violent burning pain is instantaneously experienced, which continues for eight or ten minutes; but if the part be carefully washed, it gradually ceases. The surface also becomes white, as if nitrate of silver had been applied to it, owing to the action of the creasote on the organic matters. Given internally in large doses, it occasions considerable irritation in the gastro-enteric mucous membrane; and when it destroys, death is preceded by more or less narcosis; hence it has been ranked as an acro-narcotic poison. (Christison.) In three experiments which were made with it on dogs by Dr. Cormack, of Edinburgh, twenty-five drops of pure creasote were injected into the veins. All the animals died. Its first deleterious action was a powerful one of sedation on the heart; the vital energies of that viscus seeming to be instantaneously paralyzed. In some instances, hurried and sonorous respiration continued for more than a minute after the heart had ceased to beat. In general, one or two convulsions, resembling those of tetanus, preceded death. In every instance, the atony of the heart immediately after death was very striking.

In the case of a patient of the author, who took ten drops of it by mistake, great vertigo, headache, and a sensation as if the head were about to burst by expansion, supervened; with vomiting, and much gastric distress. When taken for a length of time, it appears to communicate a blackish hue to the urine, and, in some cases, can be detected in that fluid.

Creasote is used as an internal excitant in cases of gastrodynia, and flatulence of the stomach and bowels; but it does not seem to possess any advantage over the essential oils and other diffusible excitants, whilst it has the objection of being exceedingly disagreeable. It has been tried—it is not easy to see on what principle—in diabetes mellitus; but the encouragement is not great to repose any confidence in it. Nor has its efficacy been more marked in gouty and rheumatic cases, in which it has been prescribed by some. Of its value in internal hemorrhage, mention is made under the proper head. (See ASTRINGENTS.)

Externally, it has been employed in various cases as a topical excitant—for example, in the form of wash or ointment; in burns; chafing of the integuments—*intertrigo;* local erysipelas; sore nipples; chilblains; fissures of the skin; and ulcers, especially of the sluggish, atonic kind; and, indeed, of every kind in which it seems advisable to change the action of the parts by an appropriate excitant,—or where, from the offensive nature of the discharge, an antiseptic or disinfectant is needed. With the former object, it is often applied pure by means of a camel's hair pencil. With the latter, it has been used more or less diluted, in cancerous affections of the uterus and other parts; in lupus, and various other chronic cutaneous affections; in ophthalmia tarsi; prolapsus vaginæ, &c. It has likewise been applied in cases of toothache, by means of a camel's hair pencil passed into the hollow of the tooth, or of cotton dipped in a mixture of equal portions of creasote and alcohol. In deafness, connected with a deficiency of ceruminous secretion, it has been used with advantage, in the proportion of one part of *creasote* to six or eight parts of *olive oil* or *lard.* It may be introduced into the meatus by means of a camel's hair pencil. As a caustic, it may be applied undiluted.

Besides its excitant properties, it possesses others, which have been described in the proper places.

It is sometimes given in the form of pill, which greatly masks its disagreeable characters. (*Creasot.* ♏x; *Glycyrrhiz.* pulv. ʒj; *Mucilag. acaciæ*, q. s. ut fiant pilulæ xx. Two for a dose.) One or two drops of creasote may be diffused, by means of mucilage, in some aromatic water.

The strength of lotions may vary from ♏ij to ♏vj to the fluidounce of water. The ordinary strength of *Creasote water* is, however, one part of creasote to eighty of water. Creasote may also be added to poultices, in cases of foul or gangrenous ulcers.

UNGUEN'TUM CREASO'TI, OINTMENT OF CRE'ASOTE.—(*Creasot.* ʒss; *Adipis* ℥j.) This ointment is of a good strength for ordinary cases of cutaneous disease. The author has succeeded in removing lupus, and porrigo of the scalp by means of it, after other topical agents had failed.

44. AMMO'NIA.

The different preparations of ammonia are excellent excitants, and well adapted for the relief of certain morbid conditions.

AMMONI'ACAL GAS is obtained for medicinal purposes by the decomposition of *muriate of ammonia*, by means of *lime*, which has a stronger affinity for the chlorohydric acid than the ammonia; and consequently displaces it. The ammonia is given off in the gaseous state. It is too excitant, however, under almost any form of management to be employed therapeutically; and as it is very soluble in water, it is allowed to combine with that fluid and form the following preparation.

1. LIQUOR AMMO'NIÆ, SOLU'TION OF AMMO'NIA, WATER OF AMMONIA.—The specific gravity of this preparation—as directed in the Pharmacopœia of the United States—is 0·96; and 100 grains of it saturate 30 grains of officinal sulphuric acid. It is a transparent, colorless liquid, of a highly pungent odor, and caustic alkaline taste. Sometimes it contains carbonate of ammonia: this may be detected by lime water, which occasions a milky precipitate of carbonate of lime, if carbonic acid be present; and it effervesces with dilute acids. When exposed to the air, it quickly parts with ammonia, and absorbs carbonic acid, so that it must be kept in well-stopped bottles. It unites with oil, so as to form soaps or liniments.

Liquor ammoniæ, of the United States Pharmacopœia, is not often prescribed internally in its uncombined state; but when properly diluted, it may be given in cases of heartburn, accompanied by atony of the digestive organs; its alkaline properties neutralizing the acid already in the stomach, whilst its excitant action tends to prevent the generation of more. Carbonate of ammonia is, however, usually preferred.

Liquor ammoniæ is held, as an excitant, to the nose in cases of fainting, that its vapor may impress the olfactory nerves. It is affirmed, that an attack of epilepsy has been prevented in this manner. It has been occasionally used, and, it is said, with success, in cases of asphyxia, as from drowning; the epiglottis being touched with the finger, or a feather, dipped in a little of it: care, however, must be taken, lest the vital spark be extinguished by it. It is most commonly employed to induce rubefaction in a variety of affections, especially in those of a rheumatic or neuralgic nature. It has been suggested as a local excitant in amenorrhœa, and in chronic leucorrhœa,—a few drops being added to milk; but it need scarcely be said, that so powerful an excitant should be used with caution. The various preparations of ammonia have been extolled, too, in the bites of poisonous serpents and insects, and they certainly are often of decided advantage.

The dose of liquor ammoniæ is from gtt. v to gtt. xx, or xxx, properly diluted with milk.

Solution of ammonia is used chemically in the preparation of *Aconitia*, *Ferri Oxidum Hydratum*, *Morphia*, *Strychnia*, and *Veratria;* and it enters into the composition of *Hydrargyrum Ammoniatum*, and *Linimentum Hydrargyri*, of the Pharmacopœia of the United States.

2. **LIQUOR AMMO'NIÆ FOR'TIOR, STRONG SOLU'TION OF AMMO'NIA.**—An aqueous solution of ammonia, of the specific gravity 0·882, is directed in the Pharmacopœia of the United States: as, however, it is prepared by the druggist, it is not placed amongst the preparations, but in the Materia Medica list. This stronger solution of ammonia may be employed to make *Liquor Ammoniæ*—the preparation last described—by mixing one part by measure of the stronger solution with two parts of distilled water.

Strong solution of ammonia has been introduced into the pharmacopœias, mainly on account of its counter-irritant properties, to excite rubefaction and vesication of the cutaneous surface. When two parts of *Liquor ammoniæ* are united with one part of *suet*, and one of *oil of sweet almonds*, the mixture forms the *Pommade ammoniacale of* Gondret, which has been used for a long time to excite a speedy revulsion in chronic affections of the brain, incipient cataract, amaurosis, &c., as well as to cauterize the integuments deeply. This is the formula of the French Codex; but according to M. Trousseau it is much too hard for use, unless the weather is warm. He proposes two different formulæ,—one for summer, and the other for winter. In the former he directs three parts of *lard*, one of *suet*, and four of *liquor ammoniæ;*—for the latter, equal parts of lard and liquor ammoniæ. M. Gondret himself has communicated a formula for his *Pommade*, which differs from that of the Codex, and, in his opinion, succeeds better. Take of *lard* 32 parts; *oil of sweet almonds*, 2 parts.

Melt by a gentle heat, and add *liquid ammonia* at 25°, 17 parts, stirring until it becomes cold.

Strong solution of ammonia also forms the basis of the counter-irritant or "*antidynous lotions*" of Granville, which were brought forward a few years ago with high pretensions by Dr. Granville, of London; and in a manner not calculated to enhance his professional reputation. The stronger and the milder lotion were composed as follows:—

Stronger ammoniated lotion.—℞. Liq. ammon. fort. fʒx; spirit. rosmarin. f℥ss; camphor. ʒij.—M.

Milder ammoniated lotion.—℞. Liquor. ammon. fort. f℥j; spirit rosmarin. fʒvj; tinct. camphor. fʒij.—M.

The stronger of these lotions is a powerful agent. They are both employed as cutaneous revellents, and their special application will be considered elsewhere. (See REVELLENTS.)

3. SPIR'ITUS AMMO'NIÆ, SPIRIT OF AMMO'NIA.—This preparation is made in the same manner as liquor ammoniæ, by decomposing *muriate of ammonia* by means of *lime*, and causing the ammoniacal gas to pass into *alcohol* in place of water. It is, therefore, ammonia dissolved in alcohol, and possesses the properties of the ammoniacal preparations in general. It is chiefly, however, used in the preparation of the ammoniated tinctures, but may be given as an excitant in the dose of 20 to 60 drops, in a wine-glassful of water.

4. SPIR'ITUS AMMO'NIÆ AROMAT'ICUS, AROMAT'IC SPIRIT OF AMMO'NIA (p. 434).—The spirit of carbonate of ammonia, in this preparation, is rendered more agreeable by the addition of aromatics, and is much used in faintness and flatulence;—in the former case, as an excitant, being held to the nose; and in most cases administered internally. The dose is the same as that of *spiritus ammoniæ.*

5. AMMO'NIÆ CAR'BONAS, CAR'BONATE OF AMMO'NIA, called also *Sal volat'ilë* and *Hartshorn salt*, is prepared by subliming a mixture of *muriate of ammonia* and *chalk* (carbonate of lime). The muriatic acid lays hold of the lime; and the carbonate of ammonia sublimes.

Carbonate—sesquicarbonate (London Pharmacopœia)—of ammonia is in whitish translucent fibrous masses, of a powerfully ammoniacal odor, and a pungent alkaline and ammoniacal taste. It is wholly soluble in water, and entirely dissipated by heat. When exposed to the air, it falls into powder; becomes opaque, and loses ammonia. It forms soaps with oils, and is freely soluble in dilute alcohol; but very slightly so in alcohol.

It possesses all the excitant properties of ammoniacal preparations, tempered by the combination with carbonic acid. It is, therefore, more frequently given as an excitant, where the object is to support the powers, than any of the others. In long-protracted fevers, particularly of the typhous class, it is frequently prescribed alone, or along with other excitants, as wine whey. It is also given in heartburn dependent upon an asthenic condition of the digestive organs. Under the name "*smelling salts,*" it is in constant domestic use in fainting. Usually, in such cases, an aromatic oil, as oil of bergamot or of lavender, is added; and at times its strength is increased by the addition of a little of the stronger solution of ammonia. The dose, as an excitant, is from five to ten grains every few hours, in the form of pill, or mixed with a little syrup, which masks its taste.

It is sometimes used, mixed with oil or lard, or dissolved in water, as a topical excitant and revellent, in rheumatic pains, &c., but the liquid preparations of ammonia are employed more readily, and quite as satisfactorily.

Carbonate of ammonia enters into the formation of *Cuprum ammoniatum*, and *Liquor ammoniæ acetatis*, of the Pharmacopœia of the United States.

6. AMMO'NIÆ MU'RIAS, MU'RIATE OF AMMO'NIA.—*Muriate of ammonia, Hydrochlorate* or *Chlorohydrate of ammonia, Sal ammoniac*, is a natural production, being found in and near volcanoes; and occasionally the salt of commerce has been obtained from this source. It is now, however, principally prepared by decomposing *sulphate of ammonia* by means of *chloride of sodium* or common salt; and at the present time, in England, is manufactured from the impure ammoniacal liquors obtained as secondary products. The various modes for preparing it are well given by Dr. Pereira.

In this country, it is obtained from abroad in two commercial varieties,—the *crude* and the *refined;* the former of which is imported from Calcutta and is used in the arts; the latter is derived from England.

As met with in the shops, muriate of ammonia is white and translucent; occurring generally in concavo-convex pieces, which have the shape of the vessel into which the salt is sublimed. It is wholly volatilized by heat, and is dissolved by water. Its taste is saline and acrid; but it is devoid of smell. It is soluble in about three parts of cold, and one of boiling water; and cold is produced during the solution. It dissolves, also, in alcohol. Its specific gravity is 1·450.

It is scarcely ever employed in this country as an internal agent; but in Germany it is used in the most opposite cases;—some esteeming it to be excitant; others refrigerant and sedative. It is unquestionably excitant in large doses, both when employed internally and externally. As a lotion, it is sometimes used in cases of encephalic affections, owing to the cold it induces. With such view, it ought, of course, to be applied at the moment of solution. It need scarcely be said, however, that we have in iced water a far more available and effective application. As an excitant, it is employed in cases of sprains and contusions; in indolent tumors, inflammation of the eyes, chilblains; in chronic cutaneous affections, as scabies; and as an injection in gonorrhœa, leucorrhœa, &c. An ounce or two of the salt may be dissolved in a pint of water, to which a fluidounce or two of alcohol may be added, where it is desirable to apply it as a discutient. Solutions of the strength of ʒj to ℥ss of the salt to Oj of water may be used as washes in cutaneous affections, or as injections in the diseases above mentioned.

In pleuritic affections, according to Sir George Lefevre, it is usual in Germany to combine the tartrate of antimony and potassa with it according to the following formula:—

℞. Ammon. Muriat. ʒj.
Antim. et Potass. Tart. gr. ij.
Decoct. Glycyrrhiz. f℥vij.
Syrup. Althææ, f℥j. M.

A tablespoonful of this mixture is given every two hours; and continued in spite of the nausea, and occasional vomiting, which the first few doses seldom fail to produce. When prescribed by itself, with the same view as the nitrate of potassa, Sir George Lefevre states, that as far as his own experience is concerned, he should give it a decided preference. Its salt, unpleasant taste, according to Sir George, is best disguised by liquorice root in the form of decoction; or by a solution of the extract in water. Generally, after the first few doses, patients take it without disgust. M. Lebert, too, affirms, that although little used in France, it is certainly "a very precious salt" in inflammation of mucous membranes; "and howsoever theory may account for it, the fact is, that in acute and subacute bronchitis, it is one of the most salutary remedies, by virtue of its solvent (*dissolvante*) and expectorant action. For the same reason, its employment becomes useful in pneumonia, after the violence of the disease has yielded to bleeding, and the bronchial mucous membrane has a tendency to disembarrass the neighboring inflamed parts by a muco-purulent secretion." It can be understood, that it may be a useful agent in chronic inflammation; but it is not so easy to see, that an excitant can be of service in the acute form.

With muriate of ammonia are prepared *Ammoniæ Carbonas*, *Ferrum Ammoniatum*, *Liquor Ammoniæ*, *Spiritus Ammoniæ*, and *Spiritus Ammoniæ Aromaticus*, of the Pharmacopœia of the United States.

45. PHOS'PHORUS.

Phosphorus is made by adding *sulphuric acid* to *bone ashes*, which consist principally of phosphate of lime. In this way sulphate and superphosphate of lime are formed. Water is added to this, and after standing for some time, the solution is filtered. It is then evaporated until it has the consistence of syrup; when it is mixed with charcoal, dried, and distilled in an earthen retort. By this process, the charcoal abstracts oxygen from the phosphoric acid of the superphosphate; the phosphorus is consequently set free, volatilized and condensed in water, in a proper receiver. It may be purified by pressing it through chamois leather under water. It is afterwards moulded into cylinders.

When pure, phosphorus is devoid of color; but it has usually a reddish hue. It has no taste, but has an alliaceous odor; is flexible at ordinary temperatures; and of a specific gravity 1·77. It is insoluble in water; but soluble in ether, and in the fixed and volatile oils.

When taken internally,—on meeting with the alkaline matters contained in the stomach and intestines, it is converted into soluble compounds, phosphurets, and hypophosphites. These are absorbed, and, in the blood, are farther oxidized and thereby converted into phosphates, in which form they appear in the urine.

In small doses, it is a powerful diffusible excitant; and in large doses, an acrid poison. It has been esteemed adapted for cases of great prostration of the powers, no matter what may be the accompanying disease. It is very rarely used, however, in this country. It is affirmed, from the personal experience of MM. A. Leroy, Chenevix, Bouttatz, and others, to be aphrodisiac; and has therefore been used in the impotence of old and debilitated subjects.

Phosphorus is shown by Liebig to be an essential constituent of neurine, and we shall not be surprised to see it prescribed in nervous diseases particularly, on the hypothesis, that want of nervous power may depend upon a deficiency in the due proportion of that element! [Since this sentence was penned for the third edition of this work, it has been so prescribed, and under the very circumstances foretold.]

Phosphorus is generally administered dissolved in ether or oil. The TINCTURA ÆTHEREA CUM PHOSPHORO of the French Codex consists of *Phosphorus* 4 parts, *Sulphuric Ether* 200 parts by weight. Each ounce contains about four grains of phosphorus; and the dose is from five to ten drops. It has been suggested as an objection to this preparation, that the ether might evaporate, and the phosphorus ignite in the stomach.

The Prussian Pharmacopœia has OLEUM PHOSPHORATUM, which consists of twelve grains of *phosphorus* dissolved in an ounce of *almond oil*. The solution is of the same strength as the ethereal solution, and consequently may be prescribed in the same doses. Both preparations may be given in some mucilaginous liquid, to which any aromatic water or oil may be added.

It need hardly be said, that great caution should be used in the administration of this powerful agent; nor does it appear to possess any properties that might not be as well supplied by articles that are more manageable. It has been prescribed, united with carburet of sulphur, in severe typhoid fever, and it is said with advantage. (Art. Sulphuris Carburetum, in *New Remedies*, 7th edit. p. 671, Philad. 1856.)

46. CALOR'IC.

Under DIAPHORETICS the effect of Caloric of a lower temperature than that of the human body was considered. We have now to regard it at a higher temperature, and one in which it is excitant.

a. HOT AIR BATH.

When air is heated to 98° and upwards as far as 130°, it acts as a powerful excitant to the organic actions; and hence is adapted for congestive cases, in which the blood has accumulated in the internal organs, and left the surface of the body. Accordingly, in certain cases of congestive intermittents and remittents, it may be advisable. It has, likewise, been used in the algid period of cholera.

Dr. Pereira affirms, that it is highly useful in asphyxia from drowning and from some other causes; yet the best opinion would seem to be, that exposure of one laboring under asphyxia to very elevated temperature can scarcely fail to be injurious.

The excitant and revellent action of the hot air bath is likewise exhibited in cases of chronic rheumatic and neuralgic affections. Sometimes, it is rendered more excitant by being impregnated with essential oils, or with sulphurous acid gas, or chlorine; and it has proved beneficial in certain chronic cutaneous diseases.

b. HOT VAPOR BATH.

The vapor bath, at a temperature of from 120° to 140°, is an excitant to all the organic actions; and is, therefore, adapted to the same class of cases as the hot air bath. In addition, however, it relaxes the skin, and is accompanied by profuse sweating. Hence, it can be employed with great advantage in long-protracted diseases of the rheumatic or neuralgic kind; and in debilitated individuals, in whom it is desirable to produce an excitation of the cutaneous system, and thus detract from mischief that may be existing internally. It has been successfully employed in rheumatic and other affections, which have completely crippled the sufferers; and by some cures of this nature that have been effected, it has attracted attention to a class of ignorant empirics, who employ it largely, combined or not with other excitants. The regular practitioner has too much neglected this potent agent: no hospital, indeed, should be without an apparatus for the purpose. It is certainly more efficacious in some affections than the ordinary aqueous baths are in any.

In Russia, the vapor bath is used as a luxury, and the author has elsewhere referred to the impunity with which the bather leaves a temperature of 137° to pass into one not above 32°. This form of bath is becoming introduced into other countries.

The vapor of hot water is sometimes applied topically,—in affections of the joints, for example; and a *douche* or stream of hot vapor is occasionally made to impinge with advantage on a part affected with neuralgia. Occasionally, too, aromatics are volatilized, and mixed with the watery vapor, as well as sulphurous acid gas, and chlorine.

c. HOT WATER BATH.

The hot water bath is one in which the temperature of the water exceeds 98° of Fahrenheit's scale. It differs essentially in its effects upon the system from the warm bath. Whilst the latter is soothing, and disposes to mental and corporeal quietude, the former is excitant, stimulating the nervous and vascular systems to a degree which, in particular predispositions and habits, and during the existence of certain diseases—those of nervous and vascular erethism, for example—is positively injurious. This is readily understood, when we reflect upon the effects occasioned by immersing the healthy body in a bath of this kind: the bulk of the extremities is increased, so that rings become too small for the fingers; the fluids expand; and hence the supervention of the most manifest signs of polyæmia. The pulse becomes quick; the respiration accelerated and embarrassed; the carotid and temporal arteries beat violently; a feeling of anxiety is experienced in the præcordial region; and these phenomena are, at times, accompanied or followed by palpitations, fainting, vertigo, and occasionally by apoplexy. All these effects are more marked, the hotter the bath; the longer the person remains in it, and the greater the degree of plethora. It ought, consequently, to be employed with caution, where there is a predisposition to apoplexy, or any other form of hemorrhage, or to violent internal inflammation.

The hot water bath is not much used therapeutically; but is adapted for the same cases as the hot vapor bath, and particularly for rheumatic and neuralgic affections. Astonishing cures have been effected in such cases by immersion in the hot springs of Virginia, the highest temperature of which is 107°. They have the advantage possessed by no artificial bath, that the water is always maintained at the same heat, no matter how prolonged the immersion may be.

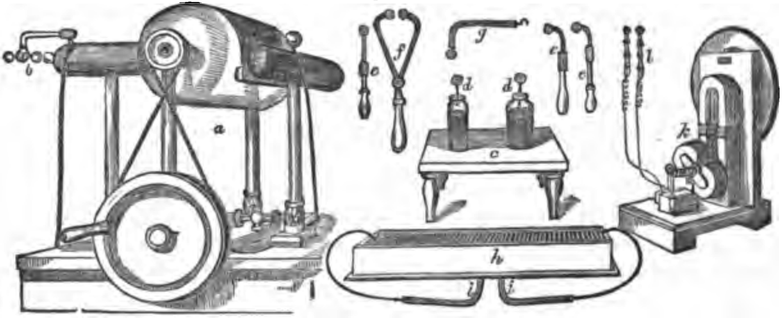
Caloric is employed topically as an excitant. Hot bricks, bottles filled with hot water, &c., are applied to the feet to excite irritation in diseases that are attended by cold extremities, as in the cold stage of intermittents, &c. The same agents, or hot flannels, or hot salt, or hot sand, are used in cases of abdominal pain, in which their action is revellent also.

47. ELECTRICITY.

Electricity, in all its forms, is excitant, and has been employed extensively, at various times, in the treatment of disease. The apparatus necessary for the medical electrician is sufficiently simple. It consists of a *cylindrical* or *plate machine*, Fig. 127; one or two *Leyden jars, d d;* an *electrometer*, *b*, to regulate the strength of the shock from the jars; a *discharging rod*, *f*, that allows a ball to be unscrewed, leaving a point in its place; an *insulated stool*, *c;* two or three *insulated directors*, *e e e;* and an *ear tube*, *g*, consisting of a small glass tube, traversed by a brass or copper wire, which terminates at one end in a small brass ball, and at the other by a loop. These are always attainable; they form parts, indeed, of the ordinary electrical apparatus for experiments, as well as for the therapeutical application of electricity. The subjoined figure from Dr. Pereira exhibits the electrical apparatus for medicinal purposes in ordinary use.

When it is desirable to subject the patient to the influence of the *electric bath*, he is placed on the insulated stool, and lays hold of a chain communicating with the prime conductor of the electrical machine, so that when the machine is in action, he forms really a part of the conductor. Positive electricity is, consequently, discharged by him at all points, and if an uninsulated metallic knob be brought near him, a spark is communicated to it in the same manner as if it approached the prime conductor. The effect of this electric condition is excitant; but no very marked influence is exerted on the functions, in the generality of cases. Dr. A. T. Thomson, however, states, that a clergyman—in whom he never could produce perspiration by any of the ordinary diaphoretics, and who never perspired by exercise, or the heat of summer—when insulated and electrified, perspired freely.

Fig. 132.



Electrical Apparatus for Medical purposes.

Friction Electricity.

a. Cylindrical Machine.
b. Medical Electrometer.
c. Insulating Stool.
d d. Leyden Jars.
e e e. Insulated Directors.
f. Discharging Rod.
g. Glass Tube traversed by a wire, which terminates at one end by a loop, at the other by a brass ball.

Voltaic Electricity.

h. Cruickshank's Wooden Trough.
i i. Directors, each consisting of a glass tube traversed by a wire, one extremity of which is connected with one end of the trough—while the other extremity is surmounted by sponge or flannel moistened with salt and water.

Magnetic Electricity.

k. Clark's Magneto-electric Machine.
l. Directors.

If, when the patient is placed upon the insulated stool, and the machine is in action, an uninsulated metallic point be held near any part of his person, the *electric aura* may be drawn from him. Or if an insulated metallic director, or wire connected with the prime conductor, be held near the part to be electrified, the *electric aura* or a current of electrified air will pass from the point to him. A sensation, resembling that produced by a stream of air on the part is felt; and it acts as a gentle excitant to delicate structures, as the eye or ear, and to excoriated or ulcerated surfaces.

If we are desirous of employing a greater amount of excitant influence, recourse is had to the *electric spark;* which is applied either by placing the individual on an insulated stool, and bringing the knuckle, or the ball of an uninsulated director near him; or by presenting to the part to be electrified the knob of an insulated director connected with the prime conductor. In the former case, the spark is drawn from the patient; in the latter it is conveyed to him; yet the therapeutical effect is alike in both cases. The sparks will be more or less powerful according to the distance at which the knob is held; and, in all cases, if they be of any size, a pungent sensation is experienced; and if a succession of sparks be drawn, the part may be made red, and a small spot or wheal be induced, which soon, however, disappears. Where it is desired to electrify deep-seated parts—as the uterus through the vagina, or the meatus auditorius internus—the conducting wire, terminating in a small knob, is made to pass through a glass tube.

The sparks may be greatly diminished in size if the part be covered with flannel; and this is a favorite mode of applying electricity with some. The patient being on the insulated stool, the knob of an uninsulated director may be placed in close contact with the flannel, moving it steadily and rapidly, so as to draw a multitude of small sparks. This plan has been termed, by some, *electric friction.*

But the most violent effect is produced by the *electric shock.* In this case, the part of the body to be electrified is made to form a portion of the circuit through which the electric discharge has to pass from one side of a Leyden jar to the other. The jar is charged from the prime conductor; and around its exterior, and communicating with the tinfoil surrounding it, a chain is placed, which is again connected with the ball of an insulated director. This ball, thus communicating with the exterior of the jar, is brought in contact with one side of the part to be electrified, whilst the knob of the jar, which communicates with the inner coating, is brought in contact with the opposite side. The discharge then takes place instantaneously with a shock; and by means of the "medical electrometer," as it is termed, the strength of the charge can be graduated. The effects, produced by the shock, vary greatly according to the intensity of the charge. They may merely consist of a slightly disagreeable sensation; or may be extremely painful; and, when very intense, may destroy life. This method of electrifying, consequently, requires more circumspection than the others; and may not be adapted for those who are very impressible.

At times, a coated glass tube is substituted for the Leyden phial, the medical electrometer being employed. The patient then receives a rapid succession of slight shocks, constituting what has been called *electrical vibration.*

The *electric current,* as it is termed, is formed by connecting a part of the patient's body with the prime conductor in action, so that the electricity shall pass through the body to the ground. This is, however, so feeble an agency as to be scarcely worthy of the attention of the therapeutist.

Electricity is employed as an excitant in a variety of nervous affections. In paralysis, it has been most extensively used; and especially in the partial form. Where the mischief is encephalic, much good cannot be expected from it; yet favorable testimony has been adduced even in these cases by Dr. Golding Bird. In nervous deafness, sparks have been given to, or taken from, the mastoid process; and around the meatus auditorius externus, and the bottom of the meatus. The same form, as well as the electric aura, has been employed in amaurosis; but it too often fails. It has also been largely used in chronic rheumatism, and in the stiffness and rigidity that follow sprains or bruises. Of its use as an emmenagogue, mention is made elsewhere. It has been prescribed in the form of *electric* *friction*, or of ***slight shocks***, to promote the biliary secretion; and to modify the function of nutrition, so as to discuss indolent tumors; and recent observers have afforded testimony as to its advantages in chorea and other neuroses, in the form of electrification or of slight shocks along the spine. At one time, it was much more largely used than at present; and although a stimulus has been afforded to its re-employment by the testimony of recent observers, as of Drs. Addison and G. Bird, the cases in which it can be productive of much benefit are probably limited.

48. GALVANISM.

The therapeutical effects of galvanic or voltaic electricity are like those of ordinary electricity; and it has been used in the same cases, —in paralysis, general and local; amaurosis; deafness and dumbness of recent duration; rheumatism, &c.

The apparatus, usually employed (Fig. 127) consists of—1. Two Cruickshank's batteries, each containing fifty pairs of copper and zinc plates, three inches square; 2. Copper wire communicating with each end of the battery; and 3. Two insulated directors, consisting of a glass tube, through which the wire from each end of the battery passes,—the free extremity, which has to be brought in contact with the part to be galvanized, being covered with sponge or flannel, moistened with a solution of common salt. When the battery is to be put in action, it may be charged with a solution of common salt, or with a weak acid liquor, consisting of not more than 1·500th part of muriatic acid; and where the skin is very sensible, water alone may be used. (Pereira.) The wire or electrode communicating with one pole of the battery is then applied to the part to be galvanized; and the other electrode at a distance from it, so as to include the affected part in the circuit. The circuit may be rapidly broken or completed, as the operator considers proper. In this manner, either a *galvanic current* or a *galvanic shock* may be employed as may be deemed advisable.

A different mode of application has been introduced; to which the name *Mansford's Plates* has been occasionally given, after its proposer. It consists essentially in removing the cuticle from two parts of the cutaneous surface; applying a plate of silver to one excoriated surface, and a plate of zinc to the other, and connecting the two by means of a copper-wire. The exact steps of the process the author has given elsewhere. (*New Remedies*, 7th edit. p. 399: Philad. 1856.) A continuous current may be equally conveyed, and much more conveniently, by a small apparatus of recent construction called, after its inventor, "Pulvermacher's Hydro-electric Chain Battery." It is also capable of communicating shocks, and producing powerful contractions.

Under the idea, that the galvanic and nervous fluids are identical, Dr. W. Philip employed galvanism successfully in asthma; transmitting the influence from the nape of the neck to the pit of the stomach, with a power varying from ten to twenty-five pairs of plates. In these cases, it probably acts as a revellent, its excitant action making a new impression on the nerves, which detracts or derives from the erethism in the respiratory nerves. In cases, too, which are dependent upon paralysis of those nerves, the excitant influence of galvanism may be beneficial. In the same way, we explain the salutary influence of the plates in epilepsy; in angina pectoris, and in neuralgic affections of the chest especially, and in paraplegia. Cases of good effects from the action of the galvanic battery in amaurosis have been published, the galvanic current being made to pass from the mastoid process to the superciliary ridge.

Galvanism has likewise been suggested as a remedy in asphyxia; and the suggestion is good. It has, however, very often failed; and as the cessation of the heart's action is the irrevocable cause of death, and galvanism exerts little or no influence on that organ, it is probable, that it may not render as much service as was at one time anticipated.

Galvanic electricity is now, however, comparatively little employed, its place having been almost wholly taken by the electro-magnetic current. Attention has, indeed, been directed recently by M. Remak, of Berlin, to the astonishing effects of the continuous galvanic current, superficially applied; even on profound lesions of the nervous centres—as encephalic paralysis; but although his observations were referred to a committee of the Imperial Institute of France, consisting of MM. Andral, Rayer, and Velpeau, the author has not seen any report from them, and they, doubtless, stand in need of farther evidence.

49. MAGNET'IC ELECTRIC'ITY.

The magnets, employed for the production of magnetic electricity, are *temporary*, or *permanent*. The apparatus, in which the former is concerned, is called a *coil machine;* that in which the latter are used a *magneto-electric* or *electro-magnetic machine.*

1. The *coil machines* are constructed in different ways. They consist essentially of a single voltaic pair, usually called the battery, a primary and a secondary coil or helix, made of covered copper wire, with a core consisting of a bundle of soft iron wires and a contact breaker; and a pair of brass or copper directors with glass handles. When the two extremities of the primary coil are respectively connected with the two poles of the voltaic pair, a voltaic current—called the primary current—traverses the primary coil. At the instant of making and breaking contact between the battery and the primary coil, a momentary voltaic current, called the secondary current, is induced in the secondary coil, and this current exists only at the moment of making and breaking contact: hence the use of the contact-breaker.

2. The *magneto-electric machine.* Various forms of this apparatus have been devised; but Dr. Pereira thinks the most convenient, simple, and powerful is that of Mr. E. M. Clarke, of London. It consists of a battery of six curved permanent magnets, and an intensity armature around the cylinder, on which 1500 yards of fine insulated

copper wire are coiled to form an intensity coil. The ends of this wire communicate respectively with a pair of directors, each of which holds a piece of sponge or flannel dipped in vinegar, or in a solution of common salt. When the armature is rotated, and a portion of the body is interposed between the directors, a succession of shocks is experienced. This machine, like the voltaic battery and coil machines, is not affected by the moisture of the atmosphere, and hence a great advantage over the common electrical machine; and as acids are not required to excite it, an inconvenience appertaining to the voltaic battery and the coil machines is obviated.

A method of galvanization by induced electricity—*Faradization*, as it has been termed by its proposer—has been recommended by M. Duchenne, of Boulogne, France, which he calls *galvanisation localisé*. He states, that if the skin, and the 'excitors'—as he terms metallic bodies communicating with the poles of a galvanic apparatus, which are placed on parts to be galvanized—are perfectly dry, and the epidermis of considerable thickness, the two electric currents are recomposed at the surface of the epidermis, without traversing the derma, and cause sparks and a peculiar crepitation, without physiological phenomena. But if we place on the skin one excitor moist, and the other dry, the individual experiences, in the point where the second excitor had developed only physiological effects, a superficial sensation evidently cutaneous. This is owing to the contrary electricities being recomposed in the point of the dry epidermis, but after having traversed the skin by the moist excitor. Again, if we moisten very slightly the skin where the epidermis is very thick on the points on which the metallic excitors are placed, a superficial sensation is experienced, stronger than the preceding, without sparks or crepitation. Here the electric recomposition takes place in the substance of the skin. Lastly, if the skin and excitors are very moist, neither sparks, crepitation, nor sensation of burning are experienced, but very variable phenomena of contractility or sensibility present themselves, according as we act on a muscle or a fasciculus of muscular fibres; on a nerve or a bony surface. In the last case, an acute pain of a very peculiar character is experienced; and, consequently, great care ought to be had not to place moist excitors over bony surfaces. M. Duchenne infers from these phenomena, that the electric power may be arrested at will in the skin; and that without any incision or puncture, it may be traversed, and the action of electricity be limited to the organs which it covers, to the nerves, muscles, and even the bones.

The alternating or vibrating current of magnetic electricity—as before remarked—is now more employed in medicine than any other.

For some of the other inventions of a galvanic nature, proposed by different individuals—as the *anodyne metallic* or *galvanic brush* of Von Hildenbrand, and the *galvanic suppositories*, &c., of Harrington, the author may refer to the work above cited. (*New Remedies*, p. 404.) They are no longer used.

50. A'CUPUNCTURE.

The operation of acupuncture—*acupuncturation*—is performed by fine, well-polished, and sharp-pointed needles. These are usually from two to four inches long; and at the blunt extremity of the needle, a head of lead or sealing-wax is attached to prevent it from being forced entirely into the body. To introduce the needle the skin is stretched, and it is inserted by a movement of rotation, aided by gentle pressure. The number of needles to be used, and the length of time they should remain, must be determined by the nature of the case, and the judgment of the practitioner.

Acupuncturation is an old Japanese remedy, which was used in Europe a long time ago; and has been revived of late years in the kind of cases, in which electricity and galvanism are employed;—for example, in rheumatic, spasmodic, and convulsive affections, amaurosis, paralysis, &c.; and it has even been proposed to pass the needles into the heart in asphyxia! In rheumatic affections its success has been marked, Dr. Elliotson having cured thirty out of forty-two by it. It has also been used in gout.

When acupuncture is conjoined with electricity or galvanism, it constitutes ELEC'TROPUNCTURE or GAL'VANOPUNCTURE. The operation consists in employing acupuncturation in the usual way, either with a single needle, or with two or more; and making a communication between them and the prime conductor of an electrical machine in action;—or, they may be made to form part of the circuit in the discharge of a Leyden jar. In this way, the electrical influence may be graduated from the simple aura to a full shock. Both it and galvano-puncture have been used in the same cases as acupuncturation; and especially in rheumatic and neuralgic affections. It is, doubtless, capable of modifying materially the nutrition of a part on which it may be practised, and it may consequently be found to exert power over morbid depositions, solid as well as fluid. (See EUTROPHICS.)

Galvanopuncture has been employed in asphyxia: it has even been suggested to pass the needles, on each side, between the eighth and ninth ribs, until they reach the fibres of the diaphragm, and then to establish a galvanic current between them, by means of a pile of 25 or 30 pairs of plates, an inch in diameter. Sometimes the circle was interrupted, at others continuous. This plan was tried by M. Leroy d'Étiolles on animals asphyxied by submersion; and when they had not been under water more than five minutes, they were often restored. As an aid, therefore, to pulmonary insufflation, galvanism, combined or not with acupuncturation, might be employed in asphyxia; but it cannot often, perhaps, be available; certainly, no time should be lost in adopting the other energetic and indispensable measures that are demanded. It has been recommended that as only a very small apparatus is necessary, batteries, consisting of a few plates, might be kept wherever there are station-houses for the reception of persons in a state of asphyxia. This suggestion is good; and they might form a part of the cabinet apparatus of the private practitioner; but whilst an assistant is preparing the apparatus for action, the practitioner should be assiduously engaged in employing other means of resuscitation.

51. EXCI'TANT GAS'ES.

Of the gases, whose effects, when inhaled, are excitant, but two have been used,—Oxygen, and Protoxide of Nitrogen; but neither is much employed as a therapeutical agent at the present day.

a. OX'YGEN GAS.

This gas, which is so essential to respiration as to have been termed *vital air*, has been subjected to numerous experiments, the general results of which are,—that it acts upon the human organism in a positively deleterious manner; and that although an animal may live in a limited portion of it for a considerable time longer than in the same quantity of atmospheric air, its respiration becomes hurried and laborious before the whole is consumed; and it dies, although a fresh animal of the same kind is capable of sustaining life for some time in the residuary air.

Oxygen gas, for therapeutical administration, may be made from *black oxide of manganese*, exposed to a full red heat in an iron retort, the gas being transmitted through water. It has been advised as an excitant inhalation in chronic debility of all kinds; and especially in anæmia, chlorosis, paralysis, &c. It should be diluted with from ten to twenty times its bulk of atmospheric air, increasing the proportion of oxygen according to the effects induced. From one to two quarts of oxygen may be breathed in the course of the day. It is said to augment the force and velocity of the pulse.

b. PROTOX'IDE OF NI'TROGEN.

This gas, called also *Nitrous Oxide Gas*, *Protoxide of Azote*, *Paradise*, *Intoxicating* and *Laughing Gas*, is now rarely used except for purposes of exhibition. It may be obtained for medicinal objects by decomposing nitrate of ammonia by means of heat, and transmitting the gas through water. The hydrogen of the ammonia attracts part of the oxygen of the nitric acid, and forms water; and the remaining oxygen, combining with the azote both of the acid and the ammonia, forms the protoxide.

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